



DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

JUN 27 2003

REPLY TO
ATTENTION OF:

CECW-B (1150-2-10a)

MEMORANDUM FOR COMMANDER, SOUTH ATLANTIC DIVISION (CESAD-CM-P)

SUBJECT: Manatee Harbor, Florida -- Limited Reevaluation Report and Environmental Assessment (LRR/EA) and Post Authorization Change Report (PAC)

1. Reference is made to the following:

a. CESAJ-PD-PN memorandum dated 30 May 2003, Subject: Manatee Limited Reevaluation Report with Environmental Assessment, Manatee County, Florida and Post Authorization Change Report for Manatee Harbor, Florida,

b. CESAD-CM-P memorandum dated 30 May 2003, Subject: Manatee Harbor, Florida, Project.

2. The Jacksonville District has requested approval of the referenced reports. The recommendation of the District Engineer is to reposition the authorized unconstructed 900 ft turning basin to the northern edge of the channel creating a 900 ft by 1,300 ft area; and widen the turns into the harbor entrance channel. The Policy Compliance Review Assessment of the recommended plan is enclosed.

3. The subject reports have been approved. The recommended project modifications are within the Chief's discretionary authority.

4. Any questions should be directed to Joe Rees at 202-761-4153.

FOR THE COMMANDER:

Encl

ROBERT F. VINING
Chief, Programs Management Division
Directorate of Civil Works

Policy Compliance Review Assessment of Manatee Harbor LRR

The following discussion presents a summary of the LRR plan selection and a policy compliance assessment of the rationale for supporting the 900X1300 foot turning basin (Plan A-4) as the NED plan.

While the NED Plan is the alternative that reasonably maximizes net benefits, it must also be consistent with protecting the Nation's environment and operating within the Corps' engineering design criteria. Table 1 presents the average annual equivalent benefits, costs, and resultant net benefits of the evaluated improvement alternatives as presented in the LRR. Based on this comparison, plan A-3 (900' turning basin with channel wideners at the authorized 40' depth) maximizes net benefits. However, the plan does not satisfy Corps engineering design criteria nor is it acceptable to the harbor pilots; therefore the LRR states that plan A-3 cannot be designated the NED plan.

Table 1: Screening of Net Benefits for Plan Alternatives with Wideners & 40' Depth (\$1,000)

		Annual Benefits	First Costs	Annual Costs	Net Benefits	BCR
	Without Project	----		----	----	----
A-3	900' turning basin	\$5,301	\$39,508	\$5,023	\$278	1.06
A-7	900'x1200' turning basin;	\$5,301	\$40,543	\$5,093	\$207	1.04
A-4	900'x1300' turning basin;	\$5,318	\$41,042	\$5,130	\$189	1.04
A-6	1200'x1200' turning basin;	\$5,318	\$41,524	\$5,160	\$158	1.03

Reference is made to EM 1110-2-1613. Para 2-4 states, "the design vessel ...is usually the largest vessel of the major commodity movers." Vessels in excess of 700' LOA have been calling at Manatee Harbor with some regularity for more than 25 years. In 1978, the original selection of a 600' LOA design vessel represented a "typical" vessel, rather than the largest of vessels that were calling at the time with some frequency. The 797' LOA design vessel identified in 2003, is drawn from the current Manatee Harbor fleet, and is significantly different than the 600' LOA vessel identified in 1978. The 797' LOA vessels currently reflect the top one percent of vessel sizes at Manatee Harbor, expanding to 5-10% over time. During the first fifteen years of the project evaluation period (2007 to 2022) at least 50 vessel calls with a length of 797' LOA are expected to visit the port annually. Consequently, the turning basin sized for an appropriate design vessel would be something much larger than 900'.

EM 1110-2-1613 is clear on the importance of safety as a component in the engineering design process for deep-draft navigation features. The harbor pilots are the individuals who are most familiar with the deep-draft navigation system. The optimum design of a specific waterway requires an evaluation of the physical conditions, (the currents and weather conditions) and the judgment of safety factors based on local pilot information. In a letter dated February 28, 2003 from the Tampa Bay Pilots Association to the U.S. Army Corps of Engineers, Jacksonville District, Captain John Wrasse discusses safety and conditions at Manatee Harbor for vessels attempting turning maneuvers. He also expresses support for the 900'x1,300' alternative, referring to it as an "effective 1,300' turning basin." The proposal was endorsed at a pilot association meeting.

The LRR and PAC present Plan A-4 (900'x1,300' turning basin with wideners and deepened to 40') as the recommended plan, in that it more closely satisfies the engineering design criteria for an 800' design vessel. Plan A-4 has been coordinated with the Tampa Bay Pilots Association and the Manatee County Port Authority and it would better suit the needs of the existing and future fleets.

Given exclusion of plan A-3 from consideration as the NED plan, **Table 1** suggests that plan A-7 would be the NED, in that it exceeds plan A-4 in terms of net benefits. However, this analysis does not address the near term presence of on-going improvements to berth 5. The LRR notes that berth 5's expansion is occurring presently. The modification of Berth 5 involves extension of the berth to a 1,200-foot with a 40-foot draft (currently 350 feet with 20-foot draft). To function effectively, it would require dredging an access channel from the turning basin area to the berth 5 extension. The LRR does present an analysis of including the berth 5 expansion as a sensitivity analysis and not the "basic" analysis. Berth 5 will be completed soon and is part of a changed condition, just as larger vessels are part of a changed condition. In that case the 900'x1300' plan would exceed the 900'x1200' in terms of net benefits (see **Table 2**). The comparative net benefits result from an analysis of a constraint that will be removed shortly. The annual benefits attributable to the Berth 5 expansion represent incremental (additional) benefits. The annual costs reflect the incremental costs associated with the construction of access to Berth 5. This "sensitivity" analysis is summarized in Table 2, and shows that of the remaining plans (after exclusion of A-3 for engineering criteria reasons discussed above) A-4 has the greatest net benefits.

Table 2. Manatee Harbor Sensitivity Analysis – Berth 5 Expansion (\$1,000)

		Annual Benefits	First Costs	Annual Costs	Net Benefits	BCR
A-7	900'x1200'	\$5,767	\$42,088	\$5,178	\$589	1.11
A-4	900'x1300'	\$5,782	\$42,111	\$5,192	\$590	1.11
A-6	1200'x1200'	\$5,787	\$42,971	\$5,251	\$536	1.10

The Policy Compliance Review Team (PCRT) was concerned that this "sensitivity" analysis, did not consistently and appropriately address the costs of the berth 5 in that it

may not have been undertaken absent the presence of the Phase I channel deepening. Further, a remaining costs and remaining benefits analysis for the Phase II aspects of the project may present more meaningful information. Therefore, the PCRT requested that the district present the remaining costs and remaining benefits for the Manatee project, considering the costs of Phase I, berth 5 expansion, and the DMDF as sunk investments.

Table 3 presents the results of a remaining benefits and remaining costs analysis with berth 5 expansion. Based on this analysis, Alternative A-4 is the plan that maximizes net economic benefits with annual net benefits of about \$206,000 and a BCR of 1.1. Based on these results, the PCRT supports Plan A-4 as the NED plan.

Table 3. Manatee Harbor Remaining Benefits-Remaining Costs (\$1,000)

		Annual Benefits	Remaining First Costs*	Annual Costs**	Net Benefits	Remaining BCR
A-7	900'x1200'	\$2,324	\$19,266	\$2,121	\$203	1.10
A-4	900'x1300'	\$2,339	\$19,387	\$2,133	\$205	1.10
A-6	1200'x1200'	\$2,344	\$20,346	\$2,193	\$151	1.07

* Phase I costs sunk; dike raising cost sunk; berth 5 bulkhead and dredging to 40' sunk; includes access triangle to berth 5 as remaining.

** With incremental O&M costs for Phase II features.

POST-AUTHORIZATION CHANGE

REPORT

FOR

MANATEE HARBOR, FLORIDA

MAY 2003

U.S. ARMY CORPS OF ENGINEERS

JACKSONVILLE DISTRICT

JACKSONVILLE, FLORIDA

I. Description of Authorized Project

The authorized Federal navigation project at Manatee Harbor provides for: a 400-foot wide entrance channel, construction of two wideners at the end of the entrance channel, and enlargement of the 700-ft diameter turning basin to provide a bottom diameter of 900 feet. The entrance channel extends approximately 3 miles (15,850 feet) in length from the turning basin to its intersection with the Tampa Harbor Main Channel. The authorized project depth is 40 feet mean lower low water (MLLW). A map of the authorized navigation project is shown in figure 1.

The project is currently divided into two construction phases. Phase I, completed in 1997, provided for deepening of the existing channel and turning area near the port to the authorized project depth. Phase II, presently the subject of a Limited Reevaluation Report (LRR), will provide new channel wideners at the junction with the Tampa Harbor channel and enlargement of the turning basin area.

II. Authorization

Congress originally authorized the navigation project for Port Manatee, Florida in the Water Resources Development Act of 1986 (Public Law 99-662). The Authorization wording is as follows: "The project for navigation, Manatee Harbor, Florida: Report of the Chief of Engineers, dated May 12, 1980, at a total cost of \$16, 400,000, with an estimated first Federal cost of \$9,500,000 and an estimated first non-Federal cost of \$6,900,000, including such modifications as the Secretary determines to be necessary and appropriate to mitigate the adverse effects of construction, operation, and maintenance of the project on the benthic environment of the area to be dredged."

As the result of cost increases above the Section 902 limit, a Post Authorization Change (PAC) Report was submitted to Congress for approval in 1990. The Water Resources Development Act of 1990, section 102 (j) authorized the project at the higher estimated cost. The wording is as follows: "The project for navigation, Manatee Harbor, Florida, authorized by section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4093), is modified to direct the Secretary to construct the project substantially in accordance with the post authorization change report, dated April 1990, at an estimated total cost of \$27,589,000 with an estimated first Federal cost of \$12, 381,000 and estimated first non-Federal cost of \$15,208,000.

III. Funding Since Authorization

Table 1 provides a detailed breakdown of all funding since the original authorization by WRDA 1986.

Table 1: Funding Since Authorization			
Fiscal Year ¹	Appropriated (\$)	Allocated (\$)	Expended (\$)
FY-88	550,000	478,000	224,287
FY-89	5,000,000	200,000	218,088
FY-90	8,662,000	500,000	396,275
FY-91	0	-137,500	163,324
FY-92	0	0	33,037
FY-93	0	250,000	134,126
FY-94	3,000,000	1,285,000	111,841
FY-95	600,000	-920,000	141,135
FY-96	1,450,000	3,440,000	2,912,775
FY-97	2,800,000	603,100	1,348,294
FY-98	1,872,000	376,000	76,252
FY-99	0	-30,000	105,255
FY-00	4,700,000	655,000	745,126
FY-01	10,807,000	525,000	412,200
FY-02	1,000,000	607	901,758
FY-03	4,000,000	3,381,000	130,956 ²
Total	44,441,000	10,606,207	8,054,731
¹ No funds were appropriated, allocated, or expended prior to FY-88			
² Expenditures thru 09 May 2003			

IV. Recommended Plan

In May 2003 a Limited Revaluation Report was prepared resulting in the following recommended plan:

The recommended plan, shown in figure 2, includes the construction of wideners along both the north and south sides of the channel at the intersection with the Tampa Harbor Channel and construction of a 900ft diameter turning basin at the eastern end of the Manatee Harbor Channel, tangent to the north side of the channel. All project features are to be dredged to the existing authorized depth of 40 feet with additional applicable overdepth.

V. Changes in Scope of Authorized Project

Turning Basin and Channel Wideners

In 1994 a Limited Reevaluation Report (LRR) was prepared for the purpose of updating cost and benefit estimates for the refined project authorized by WRDA 1990. The LRR also split the authorized work into to Phases as proposed by the

1990 PAC. The LRR was subsequently approved and Phase I was completed in 1997. All costs associated with Phase I total \$11,440,524.

In 1996 the US Army Corps of Engineers requested that the Florida Department of Environmental Protection issue a Water Quality Certificate (WQC) for the authorized plan. Issuance of the WQC was denied by the FDEP due to dense seagrass at the authorized location of the 900ft turning basin. Furthermore, the addition of a new design vessel the "Nelvana", a 797ft bulk carrier indicative of the regional fleet, calls into question the adequacy of a 900ft circular turning basin centered on the channel. Engineering analysis and input by the Tampa Harbor Bay Pilots Association indicates that the Nelvana requires a larger turning basin to safely maneuver to Manatee Harbor facilities. Based on environmental, economic, and safety considerations, it is proposed that the 900ft turning basin be moved slightly to the north and elongated in the north-south dimension to 1,300 ft thereby creating a 900 ft by 1,300 ft effective turning basin (figure 2). The depth of the turning basin would remain at the authorized project depth of 40ft with applicable overdepth. The authorized 900 ft turning basin was expected to have a total dredged volume of 400,000 cubic yards. The elongated turning basin has dredged volume estimated at 1,262,000 cubic yards.

The project as authorized in 1990 includes two channel wideners, one to the north and one to the south of the intersection of the Manatee Harbor entrance channel and the Tampa Harbor main ship channel. In 1999 a ship simulation conducted to evaluate and refine the project design indicated that both wideners require enlargement to improve navigation to Port Manatee. Modified channel widener designs propose construction from approximately Station 93+00 to the intersection of the eastern edge of the Tampa Harbor Channel Cut B (figure 2). The wideners will be excavated to a project depth of 40 feet plus applicable overdepth. The combined dredged volume of the wideners as authorized in 1990 was estimated to be 950,000 cubic yards. The modified wideners will have a combined volume of approximately 1,414,000 cubic yards.

The total dredged volume for the modified plan, including turning basin, wideners, and entrance channel is 3,878,000 cubic yards resulting in a total excavation cost of \$16,037,463. This is an increase in excavation cost (at 2003 price levels) of \$3,122,461.

Disposal Sites

The 1990 authorized project provides for the use of a 95 acre upland disposal site (figure 3), constructed by the Port Authority, for the disposal of all construction and maintenance material. Analysis of the increased excavation quantities for the recommended plan, however, leads to the conclusion that the existing dikes must be raised to a height of 55 feet to provide maximum disposal capacity. As a result, materials excavated during the first 9 of the 3-year dredging cycles can be placed into the upland disposal area provided by the port. Capacity at this site

will be maintained by offloading the upland disposal material and placing in into nearby quarry pits located on Buckeye Road, approximately 2.5 miles from the disposal site (figure 3). All remaining maintenance material removed after the initial 9 dredging cycles will be placed in the Tampa Harbor ODMDS. The total cost of disposal site construction is \$11,973,329, an increase of \$3,523,871 over the authorized plan. Total land costs increase from \$4,154,055 to \$4,179,055 for the recommended plan. Additional costs (approximately \$25,000) of acquiring the Buckeye Road quarry pits for disposal of material are offset by added benefits.

Maintenance Dredging

The project as authorized in 1990 estimates the removal of 660,00 cubic yards of maintenance material every 3 years. Disposal of the material into an upland disposal site has a predicted total cost of \$31,149,000. The recommended plan estimates that approximately 825,000 cubic yards of maintenance material will be removed every 3 years. Disposal of this material will be both upland and offshore as detailed under disposal sites above. The predicted total cost for maintenance is approximately \$61,063,221. This is a cost increase of \$29,914,221. Most of the additional costs can be attributed to offloading costs associated with the transfer of material from the upland disposal sites to the quarry pits and the mechanical dredging costs associated with disposal at the ODMDS.

Mitigation

The mitigation plan for the authorized project, as outlined in the 1990 Manatee Harbor, Florida, General Design Memorandum Supplement I calls for the lowering of 10 acres of an existing disposal island to -2 feet MLLW. The mitigation plan was coordinated with the resource agencies and the public, and was determined to be appropriate. Since the 1990 authorization, state and federal mitigation requirements have changed. As a result, the present mitigation plan to offset impacts for the recommended Manatee Harbor project is more comprehensive. Additionally, at the request of the sponsor and the Florida Department of Environmental Protection (FDEP) the recommended mitigation plan covers impacts associated with the Manatee County Port Authority's proposed berth expansions as well as the Federal navigation channel improvements. Modifications to the mitigation plan are based on impacts identified in the 2002 Environmental Assessment of the project.

The combined mitigation plan involves transplanting and salvaging seagrasses, enhancement of Bird Island, restoration of Piney Point sand spit scrape down, and establishment of a mangrove/seagrass protection zone. Total cost of the recommended mitigation plan is \$914,000 a \$737,315 increase over the mitigation plan associated with the current authorized project.

VI. Changes in Project Purpose

No change in project purpose.

VII. Changes in Local Cooperation Requirements

The items of local cooperation contained in the 1986 authorization were not modified in the 1990 PAC and WRDA 90 authorization. These items of cooperation and the items of local cooperation proposed for the recommended plan are attached as Supplement A of this PAC. Present items of local cooperation have been previously approved in the Project Cooperation Agreement signed in 1995.

VIII. Change in Location of Project

Changes related to location include moving the 900ft turning basin 250 feet to the north and elongating the basins north-south dimension from 900 ft to 1,300 ft thereby creating a 900 ft by 1,300 ft effective turning basin, the addition of the Buckeye Road quarry pits as an upland disposal site, and the use of the Tampa Harbor ODMDS as previously addressed in Item V.

IX. Design Changes

The design changes related to the changes in scope are described in item V above. Ultimately, all disposal area dikes will be raised to provide the additional capacity needed for the initial project. Neither the Buckeye Road quarry pits nor the ODMDS require additional design changes to satisfy project requirements.

X. Changes in Total Project Costs

Table 2 provides changes in the total project costs.

Table 2. Changes in Total Project Costs			
Current Cost Estimate Recommended Project	Cost Estimate as Authorized	Authorized Project Cost at March 03 Price Level ¹	Project Cost Last Presented to Congress
\$ 41,041,840	\$ 27,589,000	\$ 36,107,821	\$ 27,589,000
¹ The civil works construction cost index, EM 1110-2-1304, dated 31 March 2003 was used to update the authorized project cost to reflect current price levels			

XI. Changes in Project Benefits

The economic benefit stream for the subject harbor has changed since the PAC was submitted for Congressional approval in 1990. Shifts in the commodity distribution, as well as increased restrictions for slack tide entry were the main reasons for port benefits being changed. The commodity distribution at Port Manatee has shifted from largely liquid bulk, to dry bulk and general cargo. Liquid bulk tonnage, and its associated benefits, have been reduced. Dry bulk and general cargo tonnages have increased. These commodities typically move in vessels with relatively low operating costs; therefore, any delay is less costly, resulting in comparatively fewer benefits. The previous assumption that the wideners would remove all tidal delay, enabling 24-hour port operations was revised. The Tampa Bay Pilots' Association (TBPA) have indicated that slack tide restrictions will remain in place for all vessels drafting 34' or more. Consequently, fewer vessels benefit from the construction of the widener than estimated previously. Changes in interest rates have also affected project benefits. The discount rate used in the 1990 PAC was 8-7/8 percent; the current discount rate is 5-7/8 percent. The net impact of the above changes was a 7.4 percent reduction in project benefits from \$5,742,200 in 1990 to \$5,318,056 in 2003.

Table 3 exhibits the project benefits presented in the 1990 PAC and Table 4 displays the updated project benefits. The 1990 PAC benefits are the project document benefits reported to Congress.

XII. Benefit-Cost Ratio

The benefit cost ratio for the recommended project is 1.04 using 5.875 annual percentage rates.

XIII. Changes in Cost Allocation

Changes in cost allocation are detailed in Table 5.

XIV. Changes in Cost Apportionment

Table 6 provides cost apportionment for the authorized and recommended projects.

Table 6. Changes in Cost Apportionment			
	Authorized Project (FY 1990)	Authorized Project (FY 03)	Recommended Plan Complete Project ¹
Federal	\$ 12,415,000	\$ 16,248,454	\$ 21,653,823
Non-Federal	\$ 15,174,000	\$ 19,859,367	\$ 19,388,017
Total	\$ 27,589,000	\$ 36,107,821	\$ 41,041,840
¹ For comparison purposes, the complete project costs include both Phase I and Phase II cost estimates			

XV. Environmental Considerations in Recommended Changes

The design changes related to the changes in scope are described in item V above.

XVI. Public Involvement

The Manatee County Board of Commissioners recognizes the Non-Federal responsibilities associated with the recommended project. The Manatee County Port Authority is committed to the local sponsorship as evidenced by correspondence presented in the accompanying Limited Reevaluation Report.

XVII. History of Project

Federal involvement in the maintenance of Manatee Harbor began in 1970. A history of the resulting Federal Project is detailed below.

1970 – To provide for movement of deep draft ships, the Manatee County Port Authority dredged a 40' x 400' channel from the existing Federal project channel in Tampa Bay to their facilities at Manatee Harbor, a distance of 3 miles. After construction the Port Authority successfully petitioned the Federal Government to assume maintenance dredging of the channel.

1974 – Secretary of the Army directed the Chief of Engineers to study the navigation and related water resource problems of Manatee Harbor.

1976 – The Manatee Harbor navigation project study was initiated.

1977 – Preliminary Manatee Harbor report completed, recommending a more detailed study.

1978 – Completion of the Manatee Harbor Feasibility Report.

1980 – Chief of Engineers Report

1983 – General Design Memorandum was prepared and approved under the continued planning and engineering category. Due to more accurate estimates of the shoaling rate, the 1983 GDM identified the need for more capacity in the disposal areas to accommodate the initial project and maintenance dredging over the 50-year economic project life.

1983-1984 – Maintenance dredging of the entrance channel by the Port Authority.

- 1986 - Manatee Harbor Project was authorized by the Water Resources Development Act of 1986, PL 99-662 dated 17 November 1986. The local cooperation provisions of the project authorization require the project sponsor to cost-share by providing 25% of the project cost in cash-up front plus 10% to be paid over a period of thirty years minus credits for lands, easements, rights-of-way, relocations, and dredged material disposal areas.
- 1989 - To ensure the safety and efficiency of this navigation project, the Waterways Experiment Station performed a ship simulator study and issued their final report on 15 August 1989. The study recommended a reduced turn widener for the Tampa Harbor entrance channel on the south side of its intersection with the Tampa Harbor Main Channel and the addition a turn widener on the north side of that intersection.
- 1990 - In order to meet their financial obligation for the authorized project, the Manatee County Port Authority requested the initial project be performed in two separate sequential contracts, phase I and phase II. To address the phasing of the work and the modifications recommended by the WES ship simulator study, a supplement to the GDM was prepared. The GDM was accompanied by a new draft LCA based on performing the initial dredging work in two separate contracts and PAC covering cost increases above the 902 limitation.
- 1990 - The Water Resources Development Act of 1990, section 102 (j) authorized the Port Manatee Project at the higher estimated cost.
- 1992 - Maintenance dredging of the entrance channel by the Port Authority
- 1994 - Completion of a Limited Reevaluation Report updating cost and benefit estimates on the refined detailed design developed during the preparation of the GDM supplement and PAC.
- 1995 - PCA Phase I
- 1996 - Phase I construction completed
- 1999 - Ship simulation study was conducted to help in designing the entrance channel widenings and the proposed turning basin to accommodate future conditions. Two design vessels were used, the "El Gaucho", a 775ft long cargo ship with a 106ft beam and 36ft draft and the "Disney Magic", a 965ft long cruise ship with a 106ft beam and 26ft draft. The simulation concluded that the proposed 900ft turning basin was adequate in size, but recommended widening the entrance channel at its intersection with the Tampa channel and enlarging a portion of the channel south of the entrance to facilitate navigation within this reach.

2003 – A letter report was submitted and approved for the cost sharing of raising of the existing dikes of the upland disposal area to a height of 55feet.

Table 3**Benefits Based on Authorized Plan**

<u>Commodity Description</u>	<u>Average Annual Equivalent According to Specified Interest Rate 8-7/8%¹</u>
Liquid Bulk:	
Asphalt	\$ 17,400
Fuel Oils	\$ 2,777,200
Diesel Fuel	\$ 449,800
Gasoline	\$ 360,000
Jet/Aviation Fuel	\$ 428,200
Dry Bulk:	
Building Cement and Cement Clinkers	\$ 760,200
Gypsum	\$ 110,600
Fertilizer	\$ 814,200
Phosphate Rock	\$ 24,600

Total Benefit Value:	\$ 5,742,200
Project First Costs:	\$ 27,589,000
Average Annual Equivalent (AAEQ):	\$ 2,483,900
Estimated Annual Carrying Charges (AAEQ):	
Shoal Removal	\$ 1,400,000
Aids to Navigation	\$ 2,000
Diking of Areas	\$ 295,700
<u>Total Average Annual Equivalent Costs:</u>	\$ 4,181,600
Average Annual Equivalent Benefit	\$ 5,742,200
Benefit-to-Cost Ratio:	1.37

¹ Rate as specified for economic assessment for water resources development for fiscal year 1990

Table 4

Benefits Based on Recommended Project

	Average Annual Equivalent According to Specified Interest Rate <u>5-7 / 8% ¹</u>
Light-loading Cost Reduction (Pre-base year 2005)	\$ 1,221,490
Light-loading Cost Reduction (2005-2054)	
Dry Bulk:	\$ 2,084,258
General Cargo:	\$ 133,375
Liquid Bulk:	\$ 3,798
Delay Cost Reduction Benefits	\$ 1,875,135
Total Benefit Value:	\$ 5,318,056
Project First Costs:	\$ 41,041,823
Interest During Construction	\$ 820,209
Subtotal Average Annual Equivalent Construction Costs	\$ 2,609,680
Annual Operations & Maintenance Costs	\$ 2,519,877
<u>Total Average Annual Equivalent Costs:</u>	\$ 5,129,557
Average Annual Equivalent Benefit (AAEQ):	\$ 5,318,056
Benefit-to-Cost Ratio:	1.04

¹ Rate as specified for economic assessment for water resources development projects for fiscal year (FY) 2003.

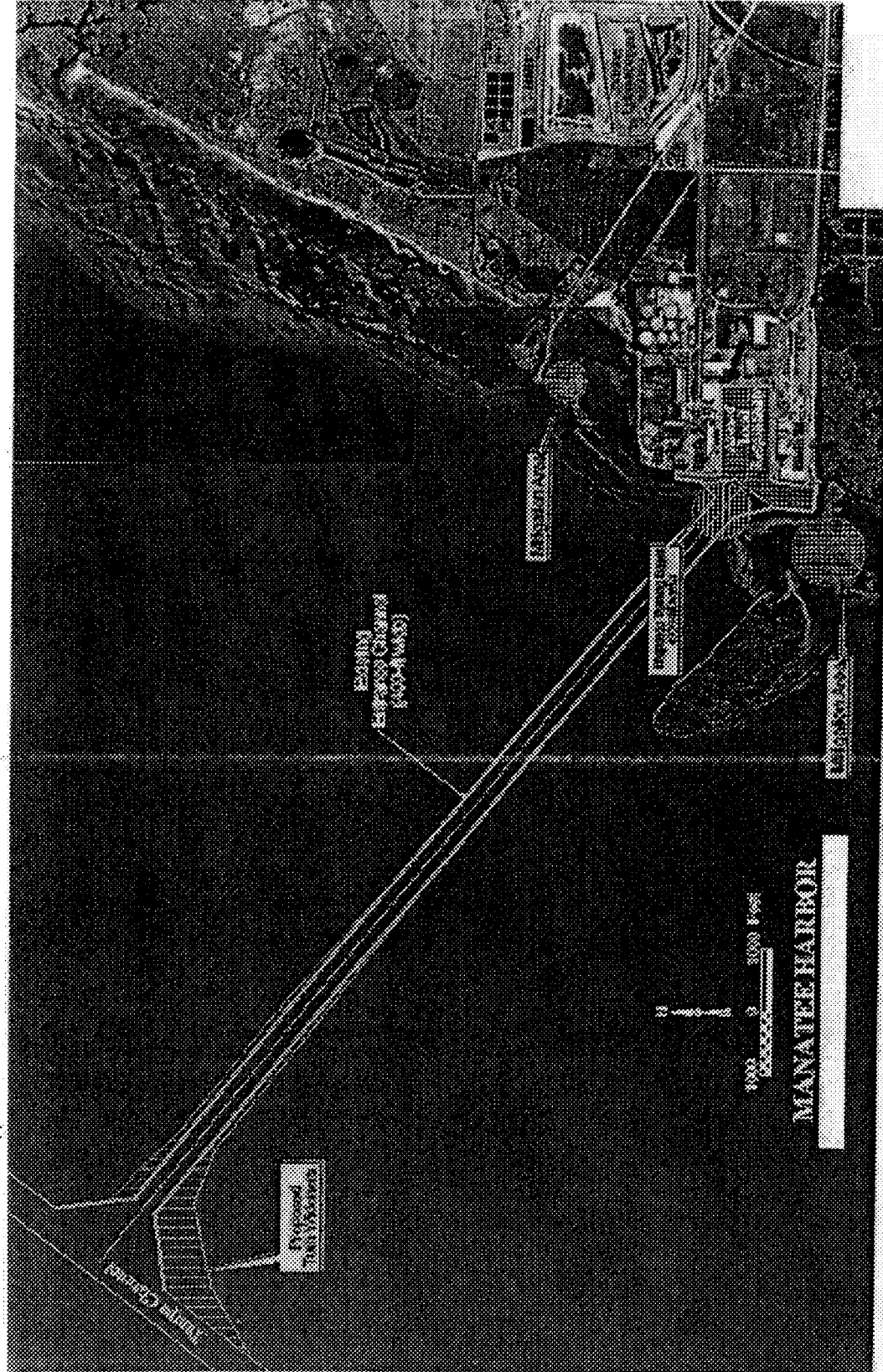


Figure 1. Manatee Harbor Authorized Plan

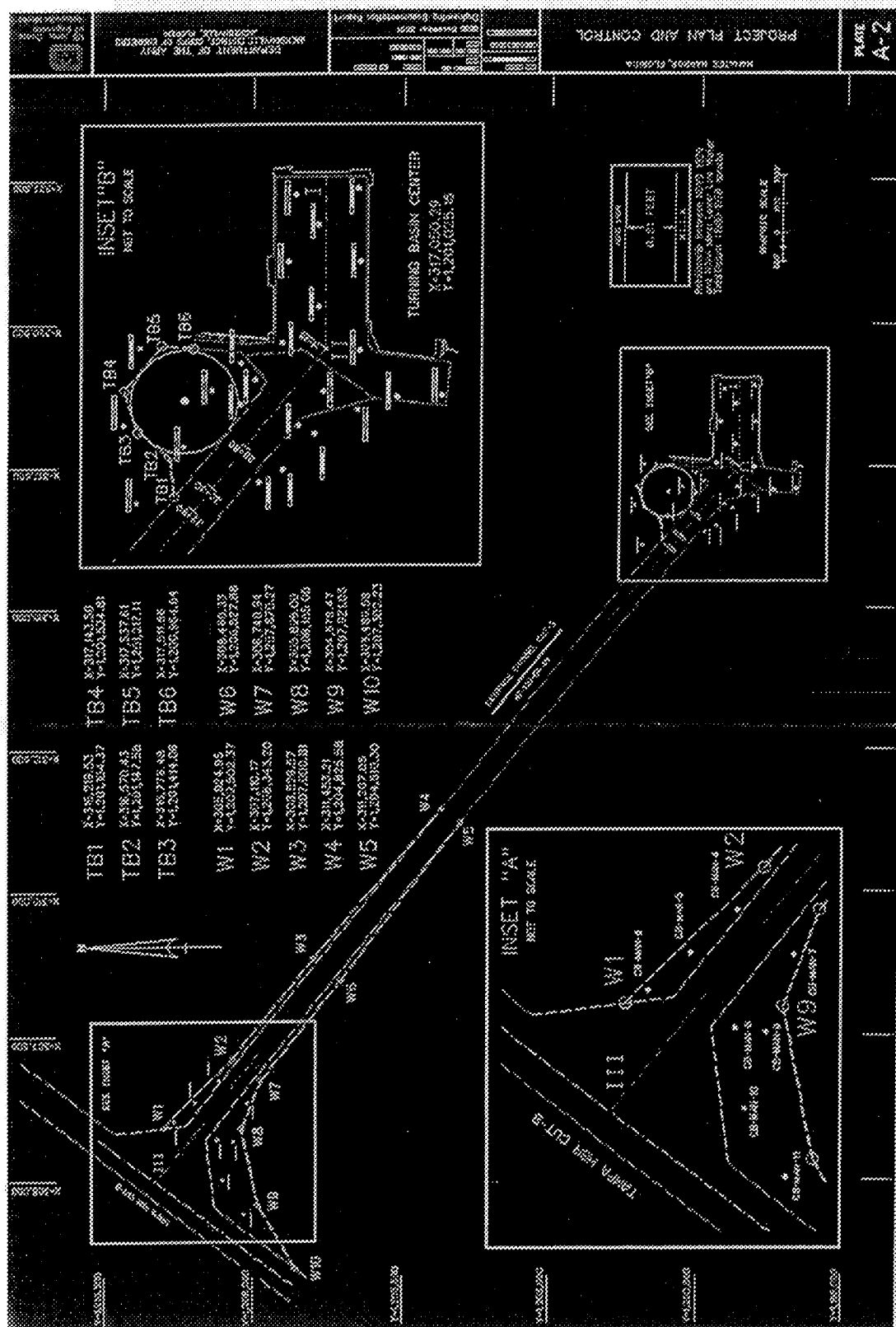


Figure 2. Manatee Harbor Recommended Plan

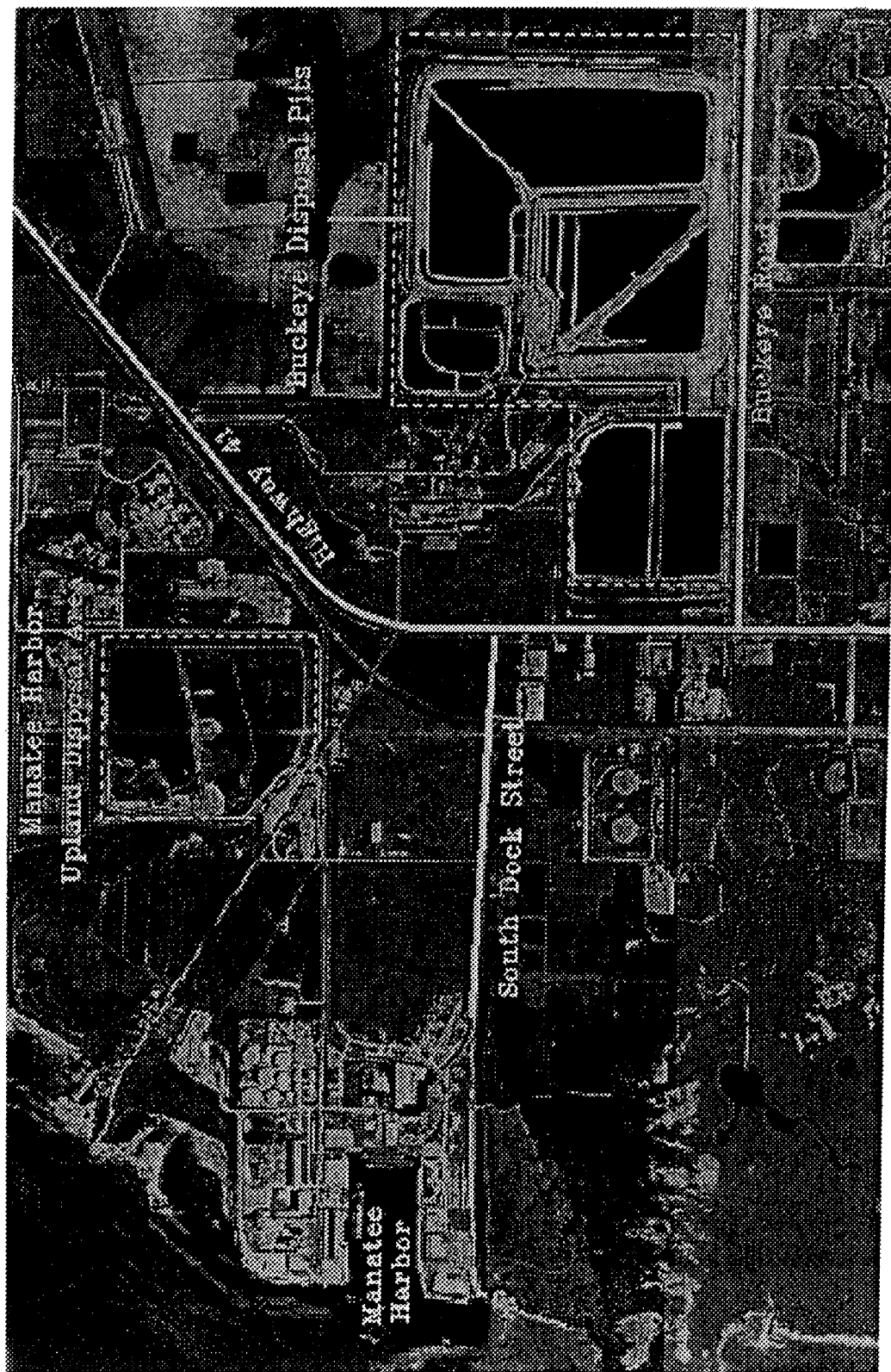


Figure 3. Upland Disposal Area and Buckeye Road Quarry Pits Disposal Area

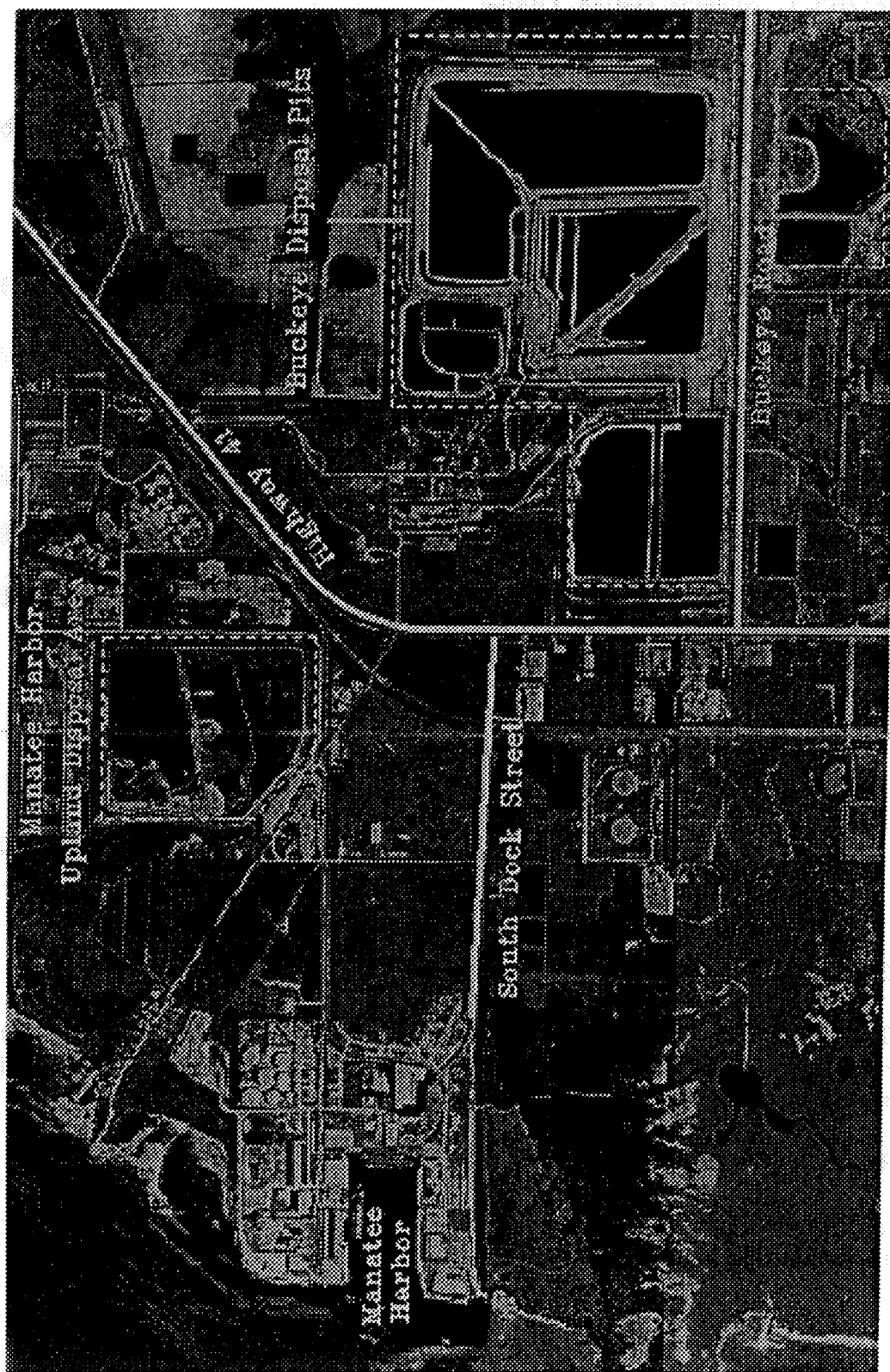


Figure 3. Upland Disposal Area and Buckeye Road Quarry Pits Disposal Area

PROJECT COST INCREASE FACT SHEET

1. PROJECT: Manatee Harbor, Florida

2. AUTHORIZATION:

Water Resources Development Act of 1986, Public Law 99-662 dated November 17, 1986; Water Resources Development Act of 1990

3. SECTION 902 LIMIT OF THE PROJECT:

a. Project cost as authorized:	\$ 27,589,000
b. Price level increases from date of authorized cost:	\$ 8,518,821
c. Current cost of modifications required by law:	\$ 0
d. 20% of line 3a:	\$ 5,517,800
e. Maximum project cost limited by section 902:	\$ 41,625,621

4. CURRENT COST ESTIMATE: (May 2003): \$ 41,041,840

5. COMPUTATION OF PERCENTAGE INCREASE:

a. Current estimate: (May 2003)	\$ 41,041,840
b. Less total of lines 3a, 3b, and 3c:	\$ 36,107,821
c. Subtotal:	\$ 4,934,019
d. Percent increase: (line 5c/3a)	17.88%

6. COST INDEX:

The Civil Works Construction Cost Index, EM 1110-2-1304, dated 31 March 2003, was used to update the authorized project cost to reflect current price levels. This resulted in an increase in the authorized cost of approximately 31 percent.

7. PROJECT SCOPE CHANGES:

Cost increases for the recommended project over the authorized project are attributed to the following:

- a) Increased dredged material volumes associated with the relocated turning basin and modified channel wideners.
- b) Additional dike height construction associated with modification of the upland disposal site.
- c) Substantial increase in costs associated with the volume, handling, and disposal of maintenance material over the life of the project.
- d) Substantial increases in costs associated with required changes to the authorized mitigation plan.

8. PROJECT BENEFIT CHANGES:

The economic benefit stream for the subject harbor has changed since the PAC was submitted for Congressional approval in 1990. Shifts in the commodity distribution, as well as increased restrictions for slack tide entry were the main reasons for port benefits being changed. Changes in interest rates have also affected project benefits. The discount rate used in the 1990 PAC was 8-7/8 percent; the current discount rate is 5-7/8 percent. The net impact of the above changes was a 7.4 percent reduction in project benefits from \$5,742,200 in 1990 to \$5,318,056 in 2003.

9. PROJECT STATUS:

To address the issue of non-permittable environmental impacts, economic, and safety issues associated with the present authorized plan, a Limited Reevaluation Report has been prepared. This report will be submitted simultaneously with the PAC for concurrent reviews and approvals. Phase I of the recommended project has been approved and constructed. Plans and specifications for Phase II have been completed within the district and coordinated with the local sponsor.

Supplement A: Items of Local Cooperation

The following table compares items of local cooperation contained in the August 29, 1979 Board of Rivers and Harbors Action Report attached to the 1978 Manatee Harbor Feasibility Report, which are associated with the WRDA 1986 authorization, and items of local cooperation presented with the recommended plan.

WRDA 86	Recommended ¹
a. The State of Florida provide a cash contribution equal to 5% of the total first cost of the project N/A	
b. Local interests shall:	
1. Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction and maintenance of the project and for aids-to-navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of dredged material, and including necessary retaining dikes, weirs, bulkheads, and embankments therefore, or the costs of such retaining works;	c. Provide all lands, easements, and rights-of-way, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project (including all lands, easements, and rights-of-way, and relocations necessary for dredged material disposal facilities); perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, maintenance, repair, replacement and rehabilitation of the Project;
2. Hold and save the United States free from damages due to the construction and maintenance of the project, not including damages due to the fault or negligence of the United States or its contractors;	g. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the United States or its contractors;
3. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements necessary for project purposes;	See c. above
4. Provide and maintain without cost to the United States vessel berthing areas and local access channels;	p. Provide and maintain without cost to the United States adequate public terminals, berthing areas, and transfer facilities open to all on equal terms;
5. Assure that the island acreage lowered to -2 feet mean low water for mitigation remains in its natural state;	q. Provide and maintain without cost to the United States, operation, maintenance, repair, replacement, and rehabilitation of all mitigation areas for the life of the authorized project as described in the recommended plan
6. Prohibit erection of any structure within 100 feet of the project channel as authorized;	Nothing proposed
7. Provide and maintain without cost to the United States adequate public terminal and transfer facilities open to all on equal terms; and	See p. above

8. Provide a cash contribution based on the final first cost allocated to special local benefits deriving from land enhancement due to landfill.	See a. below
	a. Provide, during the period of construction, a cash contribution equal to 25 percent of the costs of construction of the general navigation features which include the construction of land-based and aquatic dredged material disposal facilities that are necessary for the disposal of dredged material required for project construction, operation, or maintenance and for which a contract for the facility's construction or improvement was not awarded on or before October 12, 1996.
	b. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, up to an additional 10 percent of the total cost of construction of general navigation features. The value of lands, easements, rights-of-way, and relocations provided by the non-Federal sponsor for the general navigation features, described below, may be credited toward this required payment. If the amount of credit exceeds 10 percent of the total cost of construction of the general navigation features, the non-Federal sponsor shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of lands, easements, rights-of-way, and relocations in excess of 10 percent of the total cost of construction of the general navigation features;
	d. Provide, operate, maintain, repair, replace, and rehabilitate, at its own expense, the local service facilities; in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government; provide and maintain without cost to the United States depths in berthing areas;
	e. Accomplish all removals determined necessary by the Federal Government other than those removals specifically assigned to the Federal Government;
	f. Grant the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the general navigation features for the purpose of inspection, and if necessary, for the purpose of operating, maintaining, repairing, replacing, and rehabilitating the general navigation features;
	h. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the

	accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as will properly reflect total cost of construction of the general navigation features, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;
	i. Perform, or cause to be performed, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for construction, operation, maintenance, repair, replacement, or rehabilitation of the general navigation features. However, for lands that the Government determines to be subject to navigation servitude, only the Government shall perform such investigation unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;
	j. Assume complete financial responsibility, as between the Federal Government and the non-Federal sponsor, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features;
	k. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA;
	l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987, and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;
	m. Comply with all applicable Federal and State laws and regulations, including but not limited to,

	<p>Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination of the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of Army"; The Non-Federal Sponsor is also required to comply with all applicable federal labor standards requirements including, but not limited to the Davis-Bacon Act (40 USC 276a et seq), the Contract Work Hours and Safety Standards Act (40 USC 327 et seq) and the Copeland Anti-Kickback Act (40 USC 276c);</p>
	<p>n. Provide a cash contribution equal to the non-Federal cost share of the project's total historic preservation mitigation and data recovery costs attributable to commercial navigation that are in excess of 1 percent of the total amount authorized to be appropriated for commercial navigation;</p>
	<p>o. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute;</p>
<p>¹ Items of Local Cooperation for the Recommended Plan have been approved in the Project Cooperation Agreement sign in 1995. Items are in agreement with Public Law as presented in the Water Resources and Development Acts of 1986 and 1990.</p>	

May 2003

MANATEE HARBOR

Limited Reevaluation Report and Environmental Assessment

Manatee County, Florida



**US Army Corps
of Engineers®**

Jacksonville District
South Atlantic Division

MANATEE HARBOR FLORIDA LIMITED REEVALUATION REPORT PHASE II

TABLE OF CONTENTS

INTRODUCTION.....	1
THE AUTHORIZED PROJECT	1
Project Authority (WRDA Authorization)	1
Project History	1
Location and Area Description	4
EXISTING CONDITIONS	5
Oceanographic Conditions.....	5
Vessel Hydrodynamics	5
Geotechnical Conditions	6
Economic Considerations	6
<i>Existing Port Conditions</i>	6
<i>Existing Fleet Characteristics</i>	8
<i>Design Vessel</i>	9
WITHOUT PROJECT CONDITIONS	10
FUTURE WITHOUT-PROJECT ECONOMIC CONDITIONS	10
Commodity Projections	10
LIMITED PLAN FORMULATION.....	13
Scope of Plan Formulation.....	13
LRR Objectives.....	13
Preliminary Alternative Plans	14
Plan Screening	14
Selected Plan Alternatives	15
TRADE-OFF ANALYSIS OF PLAN ALTERNATIVES	17
Environmental Impacts and Mitigation Costs for Alternatives.....	17
Initial Quantities and Costs for Phase II	17
Cost for Phase II.....	18
Cumulative Costs for Phase I and Phase II.....	18
BENEFIT ANALYSIS.....	21
Phase I Benefit Analysis	21
Model Overview for Phase II analysis	21
Benefit Estimates.....	22
NED PLAN SCREENING	22
Safety Concerns	23
Sensitivity Analysis	25
THE RECOMMENDED PLAN	25
Environmental Summary.....	26
Operation and Maintenance.....	26
Disposal Area	27
Aids to Navigation	27

COSTS AND BENEFIT TO COST ANALYSIS	27
ENVIRONMENTAL CONSIDERATION OF THE NED PLAN.....	28
RECOMMENDED PLAN	29
Items of Non-Federal Responsibility	30
Cost Sharing.....	33
FLOOD PLAIN DEVELOPMENT	35
CZM CONSISTENCY.....	35
COASTAL BARRIER RESOURCES ACT	36
VIEWS OF THE NON-FEDERAL SPONSOR.....	36
DISCLAIMERS.....	36
CONCLUSIONS.....	36
RECOMMENDATIONS.....	37

LIST OF TABLES

Table 1: Berthing Area Description	7
Table 2: Existing Fleet: Vessel Categories and Sizes	8
Table 3: Port Manatee Base Year Commodity Data and Forecast.....	11
Table 4: Commodity Forecast Compound Annual Growth Rates (With- and Without-Project Conditions)	12
Table 5: Alternative Screening Analysis	16
Table 6: Mitigation Costs for Alternatives	17
Table 7: Initial Dredging Quantities	17
Table 8: Cost Estimate for Initial Construction for Alternatives.....	18
Table 9: Costs for Phase I and Phase II.....	19
Table 10: Interest During Construction Calculation	19
Table 11: Operations and Maintenance Cyclical Cost.....	20
Table 12: Average Annual Equivalent Benefits for Authorized Project.....	22
Table 13: Screening of Net Benefits for Plan Alternatives.....	23
Table 14: Sensitivity Analysis	25
Table 15: First Cost of Recommended Plan.....	28
Table 16: Cost Allocation	34
Table 17: Cost Apportionment.....	35

LIST OF FIGURES

Figure 1: Manatee Harbor Location Map.....	38
Figure 2: Manatee Harbor Channel Access	39
Figure 3: Port Configuration	40

LIST OF PLATES

Plate 1: Turning Basin Existing Condition	41
Plate 2: Turning Basin 900' Centered on the Channel	42
Plate 3: 900' Tangent to South Side of Channel.....	43
Plate 4: Turning Basin 900 x 1,300	44
Plate 5: Turning Basin 1,200 on Center of Channel	45
Plate 6: Turning Basin 1,200' Tangent to South Side of Channel.....	46
Plate 7: Turning Basin 900 x 1,200	47
Plate 8: Overlay of Turning Basin Configurations.....	48

APPENDICES

APPENDIX A: ECONOMICS
APPENDIX B: ENGINEERING
APPENDIX C: MAINTENANCE DREDGING AND DISPOSAL
APPENDIX D: REAL ESTATE
APPENDIX E: PERTINENT CORRESPONDENCE
APPENDIX F: 1990 PAC

INTRODUCTION

1. This study is undertaken pursuant to the 1990 WRDA authorization for Manatee Harbor construction. The authorized project is evaluated as a complete economic unit with emphasis on changed economic and environmental conditions affecting the turning basin feature. As such, this Limited Re-Evaluation Report (LRR) includes an economic update, limited plan formulation, and limited engineering analyses. This LRR serves as a decision document to recommend modifications to the authorized project. An Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Recommended Plan is attached. A Post Authorization Change Report (PAC) accompanies this document.

THE AUTHORIZED PROJECT

Project Authority (WRDA Authorization)

2. Congress authorized the navigation project for Port Manatee, Florida in the Water Resources Development Act of 1986, Public Law 99-662 dated November 17, 1986 in accordance with the Chief of Engineers Report, dated May 12, 1980 (printed in House Document 99-22 dated February 06, 1985). The selected plan in the Chief's Report recommends Federal assumption of the existing navigation project, which consists of a 400-foot wide by 40-foot deep channel from the Manatee Port facilities. The authorization wording is as follows: "The project for navigation, Manatee Harbor, Florida: Report of the Chief of Engineers, dated May 12, 1980, at a total cost of \$16,400,000, with an estimated first Federal cost of \$9,500,000 and an estimated first non-Federal cost of \$6,900,000, including such modifications as the Secretary determines to be necessary and appropriate to mitigate the adverse effects of construction, operation, and maintenance of the project on the benthic environment of the area to be dredged."

3. This project was modified in the WRDA 1990, Public Law 101-640 dated November 28, 1990 as follows: "The project for navigation, Manatee Harbor, Florida, authorized by section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4093), is modified to direct the Secretary to construct the project substantially in accordance with the post authorization change report, dated April 1990, at an estimated cost of \$27,589,000, with an estimated first Federal cost of \$12,381,000 and an estimated first non-Federal cost of \$15,208,000."

Project History

4. By House Public Works Committee Resolution adopted 11 April 1974 the Secretary of the Army directed the Chief of Engineers to study the navigation and related water resource problems of Manatee Harbor and to make recommendations to Congress on the advisability of incorporating navigation improvements at Manatee Harbor into the Tampa Harbor project. A Feasibility

Report and Environmental Impact Statement (EIS) was completed in 1978. The report identified navigating turns from the main Tampa Harbor channel to be hazardous on ebb and flood tides. Also, the report stated that "the local turning basin constructed by local interests was 1,500 feet by 800 feet. Many vessels using the port are over 700 feet long and turning maneuvers difficult." The turning basin configuration is inefficient and inadequate for larger size vessels. If maximum maneuverability for vessel turns is desired, it is at the expense of berthing space. If berths are occupied then the maneuver area is limited to an approximate 700 ft. diameter. The recommended plan was for maintenance of the channel as originally dredged, 400 feet wide by 40 feet deep, with enlarged widener and turning basin for safety and navigation. The excavated materials from the initial and all subsequent maintenance operations would be placed in a diked upland disposal area.

5. In 1983 a General Design Memorandum (GDM) was approved; this memorandum detailed the design of the feasibility report Recommended Plan. The GDM contained a revised (more accurate) estimate of the shoaling rate. A shoaling rate of 220,000 cubic yards (cy) was estimated, a change from the 50,000 cy originally estimated in the 1978 Feasibility Study. As a result, instead of 250,000 cy being removed every 5 years, 660,000 cy would be dredged every 3 years.

6. In 1989 the Waterways Experiment station (WES) performed a ship simulation study to evaluate the proposed channel improvements for safe, efficient vessel use. The design vessel was the El Gaucho, a 775-ft. long cargo ship, with beam of 106 ft. loaded to a 36 ft. draft. The improved navigation features simulated for this vessel were expanded turning wideners with Tampa Harbor and the 900 ft. turning basin, as proposed in the GDM. A General Design Memorandum supplement I, prepared in 1990, modified the project design in accordance with the WES study. The plan has been modified to incorporate the results of the ship simulator study. These modifications were refinements to the authorized plan and included reducing the south turn widener and adding a north turn widener at the intersection of the entrance channel and Tampa Harbor Main Channel. The design of the turning basin was also shifted slightly to the north to enhance ship maneuverability.

7. The Water Resource Development Act (WRDA) of 1990 modified the project based on a Post Authorization Change (PAC) Report dated April 1990. The PAC identified an increase in the estimated project cost, proposed performing the project work under two sequential contracts (phases) rather than a single contract, and recommended a reduced turn widener on the south side and providing a new turn widener on the north side of the Manatee Harbor entrance channel and the Tampa Harbor main channel intersection. The report also identified a change in scope of the authorized project in change of the maintenance cycle from 5 years to 3 years.

8. In 1994 a Limited Reevaluation Report (LRR) was prepared, as it was necessary, because more than three years have elapsed since completion of the last approved economic analysis and the project was under consideration for new start construction funding. The LRR presented the updated cost and benefit estimates on the refined detailed design developed during the preparation of the GDM Supplement I and PAC.

9. In 1996 the US Army Corps of Engineers requested a permit with Florida Department of Environmental Protection (FDEP) for the 1990 authorized plan. Permitting was denied due to dense seagrass for the authorized location that proposed construction of a 900 ft. turning basin.

10. Phase I for the deepening of the channel to Tampa Harbor, a length of about 3 miles and a width of 400 feet was completed in December 1996. The Sponsor obtained the necessary permits. The wideners and placement of a federal turning basin would need to be completed under the Phase II work as outlined in the 1990 PAC.

11. In 1999 a ship simulation study was conducted (Report date June 2000) to investigate channel improvements to the harbor to introduce the possibility of a new vessel call for a large cruise ship (copy attached to Engineering Appendix). The simulation study used two design vessels: the 775 ft long El Gaucho, and the 965 ft long Disney Magic. The bend wideners at the intersection of Manatee Harbor and Tampa Bay were designed so ships could make the turn during strong tidal currents. A 1,400 ft diameter turning was also analyzed.

12. An Engineering Design Report (EDR) with Environmental Assessment was developed in July 2002 that documented the design and cost for proposed Phase II improvements. The improvements included revised entrance channel wideners along both the north and south sides of the channel at the intersection with the Tampa Harbor Channel, and, the 900 ft. turning basin. The design change for the wideners was based on the 1999 ship simulation study, as the individual vessel track for the cargo design vessel (El Gaucho) was not significantly different from the composite vessel tracks that included the Disney Magic. The report presented relocation of the project 900-foot diameter turning basin to the northeastern end of the channel, tangential to the 400 ft. wide access channel. The EDR recommended a design change for the turning basin from the original location, as the turning basin was not implemented because of seagrass and permitting issues; no other location was subsequently tested for a turning basin other than 1400 ft. (as per 1999 ship simulation modeling). The Environmental Assessment documented that all impacts associated with construction would either be insignificant or compensated for by project mitigation measures that will reduce impacts to less than significant levels.

13. The Sponsor performed the required mitigation for the Phase II work as proposed in this report. The Sponsor requested Federal cost sharing in the cost

of the mitigation by letter dated August 30, 2002. The mitigation performed by the Sponsor included mitigation to accommodate a 1400 ft turning basin, mitigation for berthing areas and mitigation for the potential Phase II work. The mitigation does include the work addressed within this report.

14. Upon preliminary review of the EDR document, South Atlantic Division in concurrence with Headquarters US Army Corps of Engineers determined that though this plan was soundly engineered and Environmentally acceptable, it required limited plan formulation and associated analyses demonstrating the viability of this plan. The indexing of the economic analysis from the 1994 LRR as presented in this report was not sufficient as the Economic data is over 3 years old, necessitating an update of the National Economic Development Benefits as required by ER-1105-100.

15. In March 2003 a Letter Report was approved for the to cost sharing of the raising of the dikes for the upland disposal area facility to a height of 55 feet NGVD (26 feet above the previous height of 29 feet NGVD). The Letter Report addressed cost sharing based on Section 201 of WRDA 1996. The additional capacity was justified on the basis of accommodating the operation and maintenance material for Phase I dredging for about 20 years. This site will also be used to accommodate material for Phase II work. It is recognized that additional capacity or disposal options will be required to meet the disposal needs for both Phase I and Phase II of the project.

Location and Area Description

16. Port Manatee is located in the eastern Gulf of Mexico at the entrance to Tampa Bay. **Figure 1** displays the location map for the Manatee Harbor Federal Navigation Project. The Port is approximately 775 acres in size and has approximately 6,000 linear feet of deepwater berthing.

17. The Manatee Harbor Federal Navigation Project as currently authorized includes: an entrance channel 400 ft. wide, approximately 3 miles long, with a project depth of 40 ft. MLW, two turn wideners with a project depth of 40 ft MLLW, and a 900 ft circular turning basin with a project depth of 40 ft MLLW.

18. The WRDA 1990 authorization allowed construction of the authorized improvements as two Phases. Phase I included the entrance channel was completed in December 1996. Phase II construction is pending approval of this LRR and associated PAC.

19. Port Manatee is the fifth largest of Florida's 14 deepwater seaports. It is Del Monte's second largest U.S. port facility. Approximately 2,000 used cars and trucks are exported each month from Port Manatee to Central America. It ranks number one nationally for importing frozen concentrated orange juice and is the nation's leading export location for citrus juices and beverages.

EXISTING CONDITIONS

Oceanographic Conditions

20. General. The currents and water surface elevations in Tampa Harbor are subject to the irregular gulf tide, the effects of winds, upland drainage, and the variations in barometric pressure. These factors serve as boundary conditions for the hydraulic forces influencing the smaller scale limits of this study area.

21. Tides. The gulf tide is the most important factor in the circulation of water within the bay and in the variation of water elevations. The tides at Manatee Harbor can be classified as mixed semi-diurnal with generally two high and two low tides per tidal day.

Vessel Hydrodynamics

22. Ship Simulator Modeling.

a. General. The tidal currents in Tampa Bay in the vicinity of Manatee Harbor are almost perpendicular to the project channel. As a result, the turn into the project channel from the Tampa Harbor channel can be hazardous, strong cross currents acting on the vessel after it has completed the turn and is maneuvering in the channel. The Corps of Engineers Waterways Experiment Station undertook a navigation study in 1989 and again in 1999 to analyze these effects and to provide recommendations to improve navigation.

b. 1989 Ship Simulator Study. On 15 August 1989 the Waterways Experiment Station completed a ship simulation study for Manatee Harbor. The study recommends a reduced turn widener for Tampa Harbor entrance channel on the south side of its intersection with the Tampa Harbor Main Channel. The study also recommends a turn widener be provided on the north side of that intersection that was not contained in the WRDA 86 authorization. **Figure 2,** shows the approximate location of the turn wideners. Another recommendation of the study was to shift the turning basin slightly to the north.

c. 1999 Ship Simulator Study. The US Army Research and Development Center, Coastal and Hydraulics Laboratory (CHL) conducted a ship simulator based navigation study from September to December 1999 (copy attached to the Engineering Appendix). Ship pilots licensed for Port Manatee operated the simulator in "real time". Two design ships were used during the Port Manatee navigation study. One vessel was used for simulating a cargo ship and the other for a cruise ship. The "El Gaucho", a 775-ft long ship with a beam of 106 ft, was loaded to 36-ft draft for simulating a cargo ship. The prototype cruise ship used in the simulation model was the "Disney Magic", which has a 965 feet in length

overall (LOA) and a beam of 106 feet (Panamax). The Disney Magic has a maximum draft of 26 feet, which was used as design factor during the ship simulation study. Several conclusions and recommendations were presented in the ship simulation report.

23. The following recommendations are some of the most relevant concerning the 1999 simulator study.

(1) The proposed 900-foot turning basin was found adequate in size given safety reasons concerning winds and currents. However, the ship simulation concluded the turning basin would be better located on the centerline of the entrance channel. This would result in time and tug usage savings.

(2) The study also recommended widening the entrance channel at its intersection with the Tampa channel and enlarging a portion of the channel south of the entrance to facilitate navigation within this reach.

(3) The study suggested the proposed improvements should allow easing tide/wind restrictions on vessel movements in and out of Port Manatee. Also, the study strongly recommended outbound ranges for the entrance channel.

Geotechnical Conditions

24. Manatee County is located in the southwestern part of the peninsular Florida and comprises an area of about 800 square miles adjacent to the Gulf of Mexico. The Tampa Bay estuary is the largest embayment on the west coast of Florida. The estuary was formed in the limestone of the Florida Plateau that is now overlain by sediments to depths of between 40 and 100 feet. Core samples collected in 1988 and 1990 and classified in accordance with the Unified soil Classification System indicate the sediments consist of layers of poorly-graded clean sand, sand-gravel mix (SP); silty-sands, poorly-graded sand-silt mix, (SM); clayey sands, poorly-graded sand-clay mix (SC); and, inorganic clayey silts, elastic silts (MH). The shallow surficial deposits in the study area are mostly sands, silts and clays. The Engineering Appendix has more information.

25. **Excavation.** With a proposed project depth of -40 feet MLLW, plus applicable overdepths, construction of the channel widenings would involve excavation of unconsolidated materials. Construction of the turning basin would involve excavation of both unconsolidated material and rock. The unconsolidated materials and the soft to moderately hard rock could be excavated with a rock cutterhead hydraulic pipeline dredge.

Economic Considerations

Existing Port Conditions

26. Port Manatee is currently under restrictions due to low tides, strong currents, and winds present at the entrance channel, especially, at the intersection with the

Tampa Channel. The channel alignment is such that currents are perpendicular to the entrance channel. Due to those conditions and alignment of the channel, ships must wait for proper conditions to be present. Thus, they cannot enter the channel on a 24-hour basis.

27. Once at port, larger vessels face inefficient turning maneuverability. The turning basin configuration is inefficient and inadequate for larger size vessels. If maximum maneuverability for vessel turns is desired (i.e., 800 ft. by 1500 ft., as identified in the 1978 feasibility report), it is at the expense of berthing space. If berths are occupied then the maneuver area is limited to an approximate 700 ft. diameter. The existing turning basin area is displayed in **Plate 2**. Pilots report having to make up to 5-point turns in constrained conditions. In unconstrained existing conditions the requirements are for 3-point turns.

28. Tides play an important role in dictating the hours Port Manatee operates. This is accentuated when extreme low tides prevent any movement of ships in and out of the Port. Channel conditions worsen when maintenance of the channel is approaching a dredging event. Shoals and sediments decrease effective depths within the entrance channel.

29. The current configuration of Port Manatee is shown in **Figure 3**. As indicated in the figure, the Port has seven commercial berths with facilities for cruise ships and a wide variety of commodities. The port has approximately ten major tenants plus a variety of smaller users. The major tenants include larger international entities, such as Tropicana, LaFarge, Kinder-Morgan (formerly Packhoed) and Del Monte. **Table 1** displays the berth use and dimensions, as well as supporting infrastructure associated with each berth.

Table 1: Berthing Area Description

Berth No.	Length (feet)	Depth (feet)	Features	Cargo Handled	Infrastructure Facilities
11	447	40	<ul style="list-style-type: none"> • Petroleum pipeline 	General Cargo, Break-Bulk Containers, Reefer, Liquid Bulk	<ul style="list-style-type: none"> • 58,000 sq.ft. warehouse with 5 independently temperature controlled chill rooms totaling 47,000 sq.ft • Adjacent 60,000 sq.ft. warehouse with 6 independently controlled chill rooms
10	506	40	<ul style="list-style-type: none"> • Petroleum pipeline • Passenger pavilion 	General Cargo, Containers, Liquid Bulk, Break-Bulk, Passengers	<ul style="list-style-type: none"> • Dockside bunkering • 30,000 sq.ft. multi-use facility including: 27,500 sq.ft. chill rooms, 15,000 sq.ft. debarkation terminal, 15,000 sq.ft. mixed use office space
9	737	40	<ul style="list-style-type: none"> • Petroleum pipeline • RO/RO Ramp 	RO/RO, Passengers, General Cargo, Break-Bulk, Containers, Liquid Bulk, Project Cargo	<ul style="list-style-type: none"> • Dockside bunkering • Rail service • 25,000 sq.ft. embarkation cruise terminal • 5,000 sq.ft. baggage terminal • 7,000 sq.ft. passenger pavilion • 171,000 sq.ft. dry warehouse including 5,000 sq.ft. of office space
8	650	40	<ul style="list-style-type: none"> • Petroleum pipeline 	General cargo, Containers,	<ul style="list-style-type: none"> • Dockside bunkering • Rail service

			<ul style="list-style-type: none"> • Pneumatic cement discharge system 	Break-Bulk, Freeze, Chill, RO/RO, Liquid Bulk, Project Cargo	<ul style="list-style-type: none"> • Pneumatic cement discharge system below dock surface, connecting 4 silos with 50,000 sq.ft. capacity • 36,000 sq.ft. dockside warehouse for dry storage and 4,000 sq.ft. office • 100,000 sq.ft. dockside warehouse featuring 30,000 sq.ft. freeze, 20,000 sq.ft. chill, 50,000 sq.ft. ambient • 127,000 sq.ft. warehouse located 130 yds. from dock; 30,000 sq.ft. chill, 92,000 sq.ft. dry, 5,000 office
7	831	40	<ul style="list-style-type: none"> • Petroleum pipeline • 2 Fixed gantry conveyor loaders 	Dry Bulk, Liquid Bulk, Break-Bulk	<ul style="list-style-type: none"> • Dockside bunkering • Rail service • Two fixed gantry conveyor loaders, 1,200 ton/hr. capacity • 235,000 sq.ft. private terminal dry warehouses
6	686	40	<ul style="list-style-type: none"> • Petroleum pipeline • Covered clinker conveyor system 	Dry Bulk, Liquid Bulk, Break-Bulk, Containers	<ul style="list-style-type: none"> • Dockside bunkering • Rail service • 35,000 sq.ft. dry dockside warehouse • Covered conveyor system to private cement mill with 2 silos
5	350	20		Dry Bulk	<ul style="list-style-type: none"> • Rail service • 35,000 sq.ft. dry warehouse

Source: Port Manatee 2002/2003 official directory

Existing Fleet Characteristics

30. Existing fleet characteristics were based on 32 months of the Port's individual ship call data from January 1999 through August 2001. Four general types of vessels regularly call at Port Manatee: barges (tug assisted), liquid bulk vessels, general cargo vessels, and cruise ships. Containerships currently do not call on Port Manatee. Vessels calling at Port Manatee typically carry a single commodity; therefore barges, liquid bulk, and general cargo vessels may also be categorized according to the commodity carried. In order to analyze congestion and berth availability at the port, vessel categorization was refined according to vessel size (length, sailing draft, and GRT), tonnage carried, and flag, creating 50 separate categories of vessels calling at Port Manatee. **Table 2** shows the 50-vessel/commodity categories, their average lengths and typical maximum sailing drafts. Table entry "NR" indicates that sailing drafts for that vessel type were not recorded.

Table 2: Existing Fleet: Vessel Categories and Sizes

Commodity Class				
Aggregate	Ship Type	LOA	Draft	DWT
Asphalt	Barge I	240	NR	3,100
	Barge II	250	NR	3,100
	Barge I	416	24	10,799
Bag Fertilizer	Barge II	469	31	16,304
	Self-Propelled I	595	36	36,922
Bunker	Barge I	195	NR	3,100
Cement	Barge I	192	NR	758
	Barge II	449	33	14,037
	Barge III	489	37	18,819

Table 2: Existing Fleet: Vessel Categories and Sizes

Commodity Class				
Aggregate	Ship Type	LOA	Draft	DWT
	Self-Propelled I	586	36	35,107
	Self-Propelled II	731	39	74,709
	Self-Propelled III	683	35	59,153
	Self-Propelled IV	797	38	79,133
Clinker	Self-Propelled I	550	39	3,000
	Self-Propelled II	615	39	3,000
Juice Concentrate	Self-Propelled I	583	38	26,097
	Self-Propelled II	620	38	31,625
Diesel	Self-Propelled I	555	29	29,071
	Self-Propelled II	546	33	27,484
Dolomite	Barge I	506	31	21,163
	Self-Propelled I	606	36	39,320
Fertilizer	Barge I	229	NR	3,000
	Barge II	243	NR	3,000
Forest Products	Barge I	439	26	3,000
	Barge II	590	32	3,000
	Self-Propelled I	385	34	7,619
	Self-Propelled II	585	39	28,696
	Self-Propelled II	797	40	54,252
	Self-Propelled I	365	29	6,419
Fruit	Self-Propelled II	518	31	20,601
	Self-Propelled III	596	39	32,744
	Self-Propelled IV	665	29	47,249
	Self-Propelled I	443	30	11,073
Granite	Self-Propelled II	524	30	18,704
Limestone	Self-Propelled I	736	29	54,023
Linerboard	Self-Propelled I	797	40	53,111
Miscellaneous	Self-Propelled I	426	28	9,799
	Self-Propelled II	533	28	19,725
Juice Not Concentrate	Self-Propelled I	370	28	6,311
	Self-Propelled II	553	38	22,129
	Self-Propelled III	610	38	30,059
Other	Self-Propelled I	499	30	16,056
	Self-Propelled II	498	32	15,956
Cruise Passengers	Barge I	168	20	3,100
	Barge II	420	20	3,100
	Self-Propelled I	359	32	5,744
	Self-Propelled II	567	34	23,926
Steel	Cruise Vessel	611	26	40,446
	Barge I	195	NR	3,000

Design Vessel

31. A review of cargo carrier characteristics indicates little change in design vessel parameters from those selected for prior vessel simulation studies undertaken for Manatee Harbor, notably specifications for the *El Gaucho* with a length overall of approximately 770 to 780 feet and a Panamax breadth approaching 106 feet. Basic review of available information indicates that with recent developments in the world and regional fleet(s), a slightly larger design vessel could be reasonably supported. Such a vessel would be a Panamax-

class carrier approximately 790 to 800 feet in length (overall) but otherwise largely comparable to the *El Gaucho* in general specifications with the exception of a stern thruster. Accordingly, based on the existing fleet, the recommended design vessel for this analysis is the *Nelvana*, a foreign-flagged, self-discharging bulk carrier fitted with a stern thruster. Constructed in 1983, it has an LOA of 797.0 feet, a beam of 105.6, and a design draft of 45.0. The employment of thruster units for bulk carriers while not common in the past is prevalent in newer designs with some older vessels and even ocean-going barges undergoing retrofit measures for thrusters to increase maneuverability. Therefore, such a requirement is deemed reasonable and prudent for a carrier approaching 800 feet in length (overall).

WITHOUT PROJECT CONDITIONS

32. For without-project conditions, existing conditions are expected to prevail through the period of analysis with respect to Port operating practices and constraints, and navigation in the Port Manatee Channel and in the harbor. It is expected that landside handling and storage capacity will be augmented consistent with the increased flow of commodities.

33. It is assumed that under without-project conditions the volumes and mix of commodities in the above forecast will be carried on the mix of vessels profiled in Table 2. However, under without project conditions, channel depths in the Port Manatee Channel and in the harbor are assumed to be constrained to 37 feet, consistent with the pre-Phase I project depth. This would require sailing drafts of the existing fleet to be constrained to 34 feet, allowing three feet of underkeel clearance.

FUTURE WITHOUT-PROJECT ECONOMIC CONDITIONS

34. The future without condition analysis explores the expected changes in commodity movement and vessel fleet. Due to the considerable uncertainty associated with a commodity forecast that extends to the year 2052 (the end of the study period), projected commodity tonnages are held constant from year 2022 (20 years into the study period) for the remaining 30 years of the analysis period.

Commodity Projections

35. The first year of commodity projections are calculated by multiplying the base year annual tonnage by its estimated growth rate. Projections for subsequent years are calculated by simply multiplying the annual tonnage for each vessel type by the growth rate. **Table 3** shows the calculated base year and commodity

forecasts for selected years, and **Table 4** shows the compound annual rates of growth used in generating the commodity forecasts for selected years.

Table 3: Port Manatee Base Year Commodity Data and Forecast

Commodity Type	2001 Actual	2005 Base Year	2007	2012	2017	2022
Aggregate	160,355	227,101	286,404	286,404	286,404	286,404
Asphalt	105,857	108,740	110,707	115,779	121,084	126,631
Bagged Fertilizer	1,806	2,308	2,308	2,308	2,308	2,308
Bunker Fuel	1,601,425	1,679,530	1,733,705	1,876,912	2,031,947	2,199,788
Cement	283,497	297,324	306,914	332,266	359,712	389,424
Clinkers	423,335	443,983	458,304	496,160	537,144	581,513
Conc Juice	55,220	65,433	73,271	97,223	129,006	171,178
Diesel Fuel	74,885	77,614	79,488	84,373	89,558	95,062
Dolomite	175,592	197,119	212,917	258,176	313,055	379,599
Commodity Type	2001 Actual	2005 Base Year	2007	2012	2017	2022
Bulk Fertilizer	644,642	823,880	823,880	823,880	823,880	823,880
Forest Products	100,347	162,578	224,268	224,268	224,268	224,268
Fresh Fruit	304,340	334,794	356,771	418,233	490,285	574,749
Granite	27,368	36,080	43,379	43,379	43,379	43,379
Limestone	68,984	500,000	500,000	500,000	500,000	500,000
Linerboard	50,066	84,626	120,080	120,080	120,080	120,080
Miscellaneous	35,198	90,507	169,873	169,873	169,873	169,873
Juice Not Concentrate	151,142	166,265	177,180	207,703	243,485	285,432
Other	56,651	74,686	89,796	89,796	89,796	89,796
Steel	15,786	26,469	37,356	37,356	37,356	37,356
Totals	4,336,498	5,399,037	5,806,602	6,184,171	6,612,620	7,100,721

**Table 4: Commodity Forecast
Compound Annual Growth Rates
(With- and Without-Project Conditions)**

Commodity Type	2002 - 2005	2005 - 2007	2007 - 2012	2012 - 2017	2017 - 2022	2022 - 2054
Aggregate	12.3%	12.3%	0.0%	0.0%	0.0%	0.0%
Asphalt	0.9%	0.9%	0.9%	0.9%	0.9%	0.0%
Bagged Fertilizer	8.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Bunker Fuel	1.6%	1.6%	1.6%	1.6%	1.6%	0.0%
Cement	1.6%	1.6%	1.6%	1.6%	1.6%	0.0%
Clinkers	1.6%	1.6%	1.6%	1.6%	1.6%	0.0%
Conc Juice	5.8%	5.8%	5.8%	5.8%	5.8%	0.0%
Diesel Fuel	1.2%	1.2%	1.2%	1.2%	1.2%	0.0%
Dolomite	3.9%	3.9%	3.9%	3.9%	3.9%	0.0%
Bulk Fertilizer	8.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Forest Products	17.4%	17.4%	0.0%	0.0%	0.0%	0.0%
Fresh Fruit	3.2%	3.2%	3.2%	3.2%	3.2%	0.0%
Granite	9.7%	9.7%	0.0%	0.0%	0.0%	0.0%
Limestone	93.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Linerboard	19.1%	19.1%	0.0%	0.0%	0.0%	0.0%
Miscellaneous	37.0%	37.0%	0.0%	0.0%	0.0%	0.0%
Juice Not Concentrate	3.2%	3.2%	3.2%	3.2%	3.2%	0.0%
Other	9.7%	9.7%	0.0%	0.0%	0.0%	0.0%
Steel	18.8%	18.8%	0.0%	0.0%	0.0%	0.0%

LIMITED PLAN FORMULATION

Scope of Plan Formulation

36. It is not the intent of this study to conduct comprehensive plan formulation for global port improvements, but to limit plan formulation to modifications regarding the wideners and turning basin.

37. The first item involves the wideners as authorized in 1990. This modification involves widening and extending the wideners authorized as recommended by the 1999 ship simulation study.

38. The second involves proper placement of the 1990 authorized turning basin. The location of the 1990 authorized turning basin is cannot be constructed because of seagrass impacts (see Pertinent Correspondence Appendix to this document).

39. The 1989 ship simulation study only looked at a proposed turning basin at the original authorized location and the 1999 ship simulation study looked at a 1400 ft. turning basin that would accommodate a large cruise ship vessel (965 ft. LOA) that is not part of the existing fleet. The relocated turning basin will be based on meeting the needs of the existing fleet calling to Manatee Harbor as supported by the current Port infrastructure.

40. The justification of these features is to be supported by an economic analysis that results in a favorable benefit cost ratio and maximizes national economic benefits. The plan of improvement will also satisfy the needs for vessel safety given the Port's hydrodynamic conditions. Under existing conditions, ships with drafts of 27 feet or more travel the Manatee Channel during slack tide in order to avoid the strong cross currents present with tidal flows. It is estimated that nearly two-thirds of the port users enter or leave with a sailing draft exceeding 30 feet deep. Proposed improvements will allow a greater majority of projected traffic to use the facility regardless of tides and result in safer vessel navigation conditions.

LRR Objectives

41. The objective of this LRR is to recommend plan elements of Phase II (wideners and turning basin) that are environmentally acceptable, maximizes net benefits, and provide for safe navigation of the existing fleet.

42. The need for expanded wideners with Tampa Harbor have been demonstrated through ship simulation models as documented in the 1989 and 1999 ship simulation studies. Since ship simulation studies are used to optimize design features, the widener footprints described in the EDR document are assumed to be optimized and will not be considered in the plan formulation analysis.

43. For the turning basin, however, the 1989 ship simulation study addressed the original authorized location that is cannot be constructed today because of dense vegetative seagrass beds that is found in that footprint. Therefore, this LRR will consider limited reformulation in providing alternative locations to efficiently accommodate turning of the existing fleet.

Preliminary Alternative Plans

44. Preliminary turning basin plans were formulated based engineering design criteria and existing operating knowledge.

Plan Screening

45. The following turning basin alternatives were considered in the initial screening process:

- (1) **The no action plan:** This is the existing without project condition. The boundaries of its use encompass berthing areas for the design vessel. When vessels are at berth the turning basin diameter is approximately 700 feet. This is shown in **Plate 1**.
- (2) **The authorized 900 ft. centered on the channel:** This is the authorized project that was addressed in the LRR as part of a Phase II analysis. Impacts to dense seagrass precluded mitigation and deemed the authorized project as not acceptable. It is displayed in **Plate 2**.
- (3) **A 900 ft. turning basin tangent to the south side of the access channel:** This plan is representative of the authorized plan but does not meet the engineering design criteria. As it is recognized that the current design vessel (797 ft. LOA) is representative of a larger fleet, this alternative is eliminated. It is displayed in **Plate 3**.
- (4) **A 900 ft. by 1300 ft. turning basin:** This is the turning basin presented in the EDR. It is the 900 ft. turning basin tangential to the access channel (400 ft. wide). This plan has been fully coordinated with the port and is described as an effective 1300 ft. turning basin by the Tampa Bay Pilots Association. It is equivalent to the footprint of the 1200 turning basin (presented as the next item). This configuration is displayed in **Plate 4**.
- (5) **A 1200 ft. turning basin centered on the channel:** This configuration is based on engineering design criteria as applicable to the design vessel and wave and current conditions at the Port. The optimal configuration for this turning basin is the centerline of the channel. This centerline configuration has been shown in the 1999 ship simulation study for the 1400 ft. configuration to be ideal as it would result in time and tug usage savings (but may be offset by congestion at the entrance

channel). However, it overlaps the original 900 ft. authority that cannot be implemented. This configuration is displayed in **Plate 5**.

- (6) **A 1200 ft. tangent to the south side of the channel:** This configuration shifts the turning basin away from the dense seagrass area and makes maximum use of the existing federally authorized channel. It is displayed in **Plate 6**.
- (7) **A 900 ft. by 1200 ft. turning basin:** This configuration does not have as much of an overlap as the 900 ft. by 1300 ft. to the 1200 ft. diameter turning basin. This plan has not been coordinated with the Port. However, as it is nevertheless greater than a 900 ft. turning basin it is included in the economic analysis. It is displayed in **Plate 7**.

Selected Plan Alternatives

46. **Table 5** summarizes the alternative screening process. This screening basically eliminates plans that are not environmentally acceptable. The remaining plans will be further subject to an economic and cost screening analysis. The plan that maximizes National Economic Benefits based on this screening will be subject to refinement in the plan design and cost assessment.

47. Based on this screening process the plans subject for further analysis are as follows: The no action plan (plan 1); a 900 ft. turning basin tangent to the south side of the access channel (plan 3); a 900 ft. by 1300 ft. turning basin; a 1200 ft. turning basin tangent to the south side of the channel (plan 6); a 900 ft. by 1200 ft. turning basin (plan 7). The overlay of these plans is displayed in **Plate 8**.

Table 5: Alternative Screening Analysis

Plan	Environmentally Implementable	Meets Design Criteria	Cost	Benefits	Comments ¹	Further Screening
1. Existing Conditions	Yes	Base Condition	N/A	Base Condition		Yes
2. Authorized 900 ft centered on the channel	No	No	N/A	N/A	Does not meet acceptability criteria; State would not permit due to seagrass impacts	No
3. 900 ft tangent to south side of the channel	Yes	No	N/A	N/A	Does not meet efficiency and effectiveness criteria as plan does not meet engineering design criteria. Risk and uncertainty of safety considerations would be unacceptable to pilots	No
4. 900 ft by 1,300 ft	Yes	Yes	calc	calc	Equivalent footprint to 6, this locally coordinated plan has pilot input and is acceptable, efficient, effective, and complete.	Yes
5. 1,200 ft centered on channel	No	Yes	N/A	N/A	More seagrass/habitat impacts than A-2. Does not meet acceptability criteria for environmental resources	No
6. 1,200 ft tangent to south side of channel	Yes	Yes	calc	calc	Meets engineering design criteria (1.5 times LOA) for 797 ft design vessel. Meets acceptability, effectiveness, efficiency, and completeness criteria	Yes
7. 900 ft by 1,200 ft	Yes	Marginally	calc	calc	Marginally meets 797 ft design criteria(1.5 times LOA) Potentially effective, and efficient, but does not clearly have concurrence of pilots. Simulation study not performed on this alt. Marginally meets acceptability and completeness criteria.	Yes

¹ Plans screened for Economic and Environmental Principles for Water and Related Land Resources Implementation Studies criteria of completeness, effectiveness, efficiency, and acceptability.

Revised 6/02/03

Table 5: Alternative Screening Analysis

Plan	Environmentally Implementable	Meets Design Criteria	Cost	Benefits	Comments ¹	Further Screening
1. Existing Conditions	Yes	Base Condition	N/A	Base Condition		Yes
2. Authorized 900 ft centered on the channel	No	No	N/A	N/A	Does not meet acceptability criteria; State would not permit due to seagrass impacts	No
3. 900 ft tangent to south side of the channel	Yes	No	N/A	N/A	Does not meet efficiency and effectiveness criteria as plan does not meet engineering design criteria. Risk and uncertainty of safety considerations would be unacceptable to pilots Screened for further economic analysis	No
4. 900 ft by 1,300 ft	Yes	Yes	calc	calc	Equivalent footprint to 6, this locally coordinated plan has pilot input and is acceptable, efficient, effective, and complete.	Yes
5. 1,200 ft centered on channel	No	Yes	N/A	N/A	More seagrass/habitat impacts than A-2. Does not meet acceptability criteria for environmental resources	No
6. 1,200 ft tangent to south side of channel	Yes	Yes	calc	calc	Meets engineering design criteria (1.5 times LOA) for 797 ft design vessel. Meets acceptability, effectiveness, efficiency, and completeness criteria	Yes
7. 900 ft by 1,200 ft	Yes	No	calc	calc	Meets 797 ft design criteria (1.5 times LOA) Potentially effective, and efficient, but does not clearly have concurrence of pilots. Simulation study not performed on this alt. Marginally meets acceptability and completeness criteria.	Yes

¹ Plans screened for Economic and Environmental Principles for Water and Related Land Resources Implementation Studies criteria of completeness, effectiveness, efficiency, and acceptability.

TRADE-OFF ANALYSIS OF PLAN ALTERNATIVES

48. The three plan alternatives that have been screened out are further evaluated for environmental, cost, economic, and safety considerations. Alternative 3 is carried forward for full economic analysis as a basis for comparison with the authorized plan.

Environmental Impacts and Mitigation Costs for Alternatives

49. A seagrass mitigation plan is presented with the Environmental Assessment. The Environmental Assessment is the same as that presented in the Engineering Documentation Report, dated July 2002. There are no seagrass impacts at the entrance channel where the wideners are proposed for construction. The alternatives considered for the turning basin are within the coordinated area of the document.

50. The environmental costs were assessed for each of these alternatives based on impacts. The mitigation costs for Alternatives 4 and 6 are the same as the impacts are essentially within the same footprint. Alternative 7 has somewhat less impacts and Alternative 3 has a smaller footprint and therefore a lower mitigation cost. **Table 6** displays cost for each alternatives.

Table 6: Mitigation Costs for Alternatives

Alternative	Seagrass Impacts (acres)	Cost 1/ (cy 000's)
1. no action plan	---	---
3. 900 ft.	1.3	\$516,600
4. 900 ft. by 1300 ft.	2.3	\$914,000
6. 1200 ft.	2.3	\$914,000
7. 900 ft. by 1200 ft.	2.0	\$794,800

1/ Per August 30, 2002 letter from Port Manatee to SAJ. Adjusted to scale of alternative.

Initial Quantities and Costs for Phase II

51. Initial quantities (**Table 7**) were estimated for both the wideners and turning basin. The wideners are common to all of the alternatives.

Table 7: Initial Dredging Quantities

Alternative for Turning Basin	Entrance Channel Wideners	Turning Basin	Total Quantities (cy), rounded
1. no action plan	---	---	---
3. 900 ft.	1,414,000	564,951	1,979,000
4. 900 ft. by 1300 ft.	1,414,000	1,262,000	2,676,000
6. 1200 ft.	1,414,000	1,344,466	2,758,000
7. 900 ft. by 1200 ft.	1,414,000	1,075,906	2,490,000

Cost for Phase II

52. **Table 8** displays the Cost for Phase II. The estimates were developed with the Microcomputer Aided Cost Estimating System (MCACES) software program, a system used nationwide by the U.S. Army Corps of Engineers for standardizing project costs. An additional 1-foot of required overdepth and 1-foot of allowable overdepths are included in the estimated excavation quantities.

Table 8: Cost Estimate for Initial Construction for Alternatives

Alternative	A-3	A-4	A-6	A-7
Mob/Demob	\$703,800	\$703,800	\$703,800	\$703,800
Excavation	\$12,487,540	\$13,539,786	\$13,960,363	\$13,160,154
Turbidity Monitoring	\$102,000	\$102,000	\$102,000	\$102,000
Dike Raising	\$9,894,000	\$9,894,000	\$9,894,000	\$9,894,000
Construction Management (S&I)	\$1,701,044	\$1,815,600	\$1,846,200	\$1,785,000
Environmental Mitigation	\$516,600	\$914,000	\$914,000	\$794,800
Real Estate	\$25,000	\$25,000	\$25,000	\$25,000
Navigation Aides	\$15,000	\$15,000	\$15,000	\$15,000
PED	\$1,234,200	\$1,203,600	\$1,234,200	\$1,234,200
Phase II Construction First Cost	\$26,679,184	\$28,212,786	\$28,694,563	\$27,713,954

Cumulative Costs for Phase I and Phase II

53. **Table 9** displays the cumulative costs and Average Annual Equivalents for both Phase I and Phase II. These costs include interest during construction (IDC) and Operations and Maintenance (O&M). The price level is Fiscal Year 2003, and the discount rate is 5 7/8% as applicable for FY 2003. **Table 10** displays a sample computation for IDC for Alternative A-4, and **Table 11** shows the O&M costs. The O&M cost is shown for each cycle. The cyclical cost is derived from the MCACES for future maintenance requirements found in the Engineering Appendix.

Table 9: Costs for Phase I and Phase II

Alternative	Alt-3	Alt-4	Alt-6	Alt-7
Phase I Construction Cost	\$12,829,037	\$12,829,037	\$12,829,037	\$12,829,037
Phase II Construction First Cost	\$26,679,184	\$28,212,786	\$28,694,563	\$27,713,954
IDC	\$644,289	\$820,209	\$834,215	\$737,384
Total Cost Phases I and II with IDC:	\$40,152,510	\$41,862,032	\$42,357,815	\$41,280,375
SubTotal AAE	\$2,503,108	\$2,609,680	\$2,640,587	\$2,573,419
Annual O&M	\$2,519,877	\$2,519,877	\$2,519,877	\$2,519,877
Total AAE Costs	\$5,022,985	\$5,129,557	\$5,160,464	\$5,093,296

Table 10: Interest During Construction Calculation

Alternative A-4

Discount rate =	0.05875
Construction total=	\$28,212,786
Total Months =	11

Month	Construction \$	Future Payment Factor	Total
11	\$2,564,799	1.0537251	\$2,702,593
10	\$2,564,799	1.0487239	\$2,689,766
9	\$2,564,799	1.0437466	\$2,677,000
8	\$2,564,799	1.0387928	\$2,664,295
7	\$2,564,799	1.0338626	\$2,651,650
6	\$2,564,799	1.0289558	\$2,639,064
5	\$2,564,799	1.0240722	\$2,626,539
4	\$2,564,799	1.0192119	\$2,614,073
3	\$2,564,799	1.0143746	\$2,601,667
2	\$2,564,799	1.0095602	\$2,589,319
1	\$2,564,799	1.0047687	\$2,577,030
0		1.0000000	
Total Investment Cost:			\$29,032,995
Total IDC:			\$820,209

Table 11: Operations and Maintenance Cyclical Cost

cycle	year	mob	dredging	offload da	turbidity	ped	s&a	total
1	2007	\$599,315	\$2,643,178		\$5,072	\$354,471	\$380,176	\$3,982,212
2	2010	\$599,315	\$2,643,178		\$5,072	\$354,471	\$380,176	\$3,982,212
3	2013	\$599,315	\$2,643,178		\$5,072	\$354,471	\$380,176	\$3,982,212
4	2016	\$599,315	\$2,643,178	\$2,460,102	\$5,072	\$354,471	\$380,176	\$6,442,314
5	2019	\$599,315	\$2,643,178	\$2,460,102	\$5,072	\$354,471	\$380,176	\$6,442,314
6	2022	\$599,315	\$2,643,178	\$2,460,102	\$5,072	\$354,471	\$380,176	\$6,442,314
7	2025	\$599,315	\$2,643,178	\$2,460,102	\$5,072	\$354,471	\$380,176	\$6,442,314
8	2028	\$599,315	\$2,643,178		\$5,072	\$354,471	\$380,176	\$3,982,212
9	2031	\$599,315	\$2,643,178		\$5,072	\$354,471	\$380,176	\$3,982,212
10	2034	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
11	2037	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
12	2040	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
13	2043	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
14	2046	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
15	2049	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
16	2052	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
17	2055	\$1,115,091	\$4,730,308		\$40,413	\$354,471	\$380,176	\$6,620,459
Totals		\$14,314,563	\$61,631,064	\$9,840,408	\$368,953	\$6,026,000	\$6,463,000	\$98,643,988

BENEFIT ANALYSIS

54. At the most basic level, the benefit estimation method is simply an assessment of the difference in transportation costs between the without-project condition and alternative with-project conditions. Typically, transportation cost savings is identified as a significant source of benefits through the use of larger and more efficient vessels in the calling fleet. In this particular analysis, however, the major source of benefits lies in the reduction of time delays as vessels wait for slack tide to navigate safely at the entrance at Manatee Harbor with Tampa Harbor in order to avoid the strong cross currents present with tidal flows. Proposed improvements will allow the vast majority of projected traffic to use the facility regardless of tides and result in safer vessel navigation conditions. An adequate turning basin would allow vessels, especially larger ones, to maneuver more efficiently and a greater margin of safety.

55. Port Manatee does not maintain formal records or data that describe ship delays or the number of vessel calls diverted to other ports. Because it was necessary to incorporate the frequency and pattern of vessel arrivals, berth availability, vessel berth preferences, berth set-up and breakdown time, and the likelihood of diversion into a transportation cost analysis, a simulation model was developed as part of this analysis. The benefits for the Phase II analysis (for wideners at entrance channel and turning basin) were based on simulation modeling.

Phase I Benefit Analysis

56. The benefits for Phase I (deepening access channel to 40 ft. and widening to 400 ft. widening) were based on vessel calls for 2002 provided by the Port. The data was used to determine which vessels would benefit from the deepening of the Federal channel that occurred in Phase I. The same Without Project depth of 37 feet was used. Vessels currently calling that could benefit from this incremental channel depth at Manatee Harbor include bulk carriers transporting bulk fertilizer exports and bulk carriers transporting cement clinker and forest product imports.

Model Overview for Phase II analysis

57. The Port Manatee simulation model analyzes the costs of vessel traffic congestion in terms of vessel delay, diversion, tug, pilot, port, and stevedoring costs. Model runs were made over a forecast period of 20 years for with- and without-project conditions using fleet and commodity forecasts that were identical under with- and without-project conditions. Without-project conditions at the port were analyzed using Port Manatee's current port configuration. With-project alternatives incorporated the expanded wideners and the four different turning basin configurations. The (existing) channel width of 400 feet and depth of 40-feet was used in the with project analysis. Because the model used input data based on actual sailing draft, allowances for underkeel clearance were not

incorporated into the analysis. The model used an hour-by-hour simulation of port activity throughout the period of analysis. Model iterations were made in one-hour increments for each year of the forecast period, simulating vessel arrival and departures in each hour every year, for twenty years. The Economic Appendix describes the model in more detail.

Benefit Estimates

58. Economic benefits considered in this analysis are National Economic Development (NED) benefits that increase the value of the national output of goods and services. Specifically, the benefits quantified in this analysis are the reduced costs of transportation realized through the increased capacity at Port Manatee associated with implementation of the widener with Tampa Harbor and turning basin alternatives.

59. Annual transportation cost savings for each alternative were calculated as the difference between the costs of without-project conditions and with-project conditions. Economic benefits were calculated for each year of the 50-year period of analysis, and discounted at the current Federal discount rate of 5.875 percent. The undiscounted transportation and port costs for the without-project condition and with-project Alternatives and the undiscounted value of benefits as well as the discounted value of benefits are shown in the Economics Appendix. **Table 12** displays the average annual equivalent benefits for each of the alternatives.

Table 12: Average Annual Equivalent Benefits for Authorized Project

Phase I Benefits			Phase II Benefits	
Values in AAEQ at FY 2003 price level and FY 2003 Discount Rate				
Alternatives	Deepening Benefits	Benefits During Construction	Benefits for Wideners and Turning Basin	Total
Alt.-1 (no action)	-	-	-	-
Alt.-3 (900 ft.)	\$2,221,431	\$1,221,490	\$1,857,771	\$5,300,692
Alt.-4 (900 x 1300 ft.)	\$2,221,431	1,221,490	\$1,875,135	\$5,318,056
Alt.-6 (1200 ft.)	\$2,221,431	1,221,490	\$1,875,135	\$5,318,056
Alt.-7 (900 x 1200 ft.)	\$2,221,431	1,221,490	\$1,857,771	\$5,300,692

NED PLAN SCREENING

60. The NED Plan is the option that reasonably maximizes net economic benefits consistent with protecting the Nation's environment that is within the Corps engineering design criteria. Net Benefits are defined as the excess of annual benefits minus annual costs. **Table 13** presents the Average Annual Equivalent Benefits, Average Annual Equivalent Costs, and Net Benefits of the plan alternatives. Based on this analysis the 900 ft. by 1,200 ft turning basin (Alt 7) is

the plan that maximizes net benefits. However, as outlined in the precursory formulation process, this plan is not fully consistent with engineering design criteria, nor acceptable to the harbor pilots given the tides in currents at Port Manatee and therefore cannot be considered the NED plan.

Table 13: Screening of Net Benefits for Plan Alternatives

		AAE Benefits	AAE Costs	Net Benefits	BCR
		----	----	----	----
Without Project					
A-3	900' turning basin located tangent to south channel; wideners and deepening to 40'	\$5,300,693	\$5,022,985	\$277,708	1.06
A-7	900'x1200' turning basin; wideners and deepening to 40'	\$5,300,693	\$5,093,296	\$207,397	1.04
A-4	900'x1300' turning basin; wideners and deepening to 40'	\$5,318,056	\$5,129,557	\$188,500	1.04
A-6	1200' turning basin located tangent to south channel; wideners and deepening to 40'	\$5,318,056	\$5,160,464	\$157,592	1.03

Safety Concerns

61. The Corps of Engineers deep-draft navigation design guidance is clear on the importance of safety as a component in the engineering design process for deep-draft navigation features. That guidance clearly establishes that safety associated with the engineering design has priority over the cost of the design. The following paragraph from EM 1110-2-1613, 31 August 2002, Hydraulic Design of Deep Draft Navigation Projects (Chapter 2, 2-1), is provided for reference.

62. "Design of a navigation project requires an understanding of the port and waterway needs, assembly and evaluation of all pertinent information, and development of a rational improvement plan. The planner/design engineer is responsible for developing and formulating several project design alternatives. This will allow the economically optimum plan to be clearly evident and readily substantiated. Project safety and efficiency should receive primary consideration before the cost-effectiveness of the project is determined."

63. Safety issues associated with each deep-draft navigation feature is usually developed from information that is provided by local harbor pilot organizations. The harbor pilots are the individuals who are most familiar with our deep-draft navigation system. The harbor pilots complete hundreds of transits through the components (channels, turning basins, anchorage areas), of our deep-draft navigation system per day. The same Engineering Manual that is referenced above provides clear direction for integrating the pilots into the engineering design process.

64. "The designer must consider and include aspects of project safety, efficiency of ship operations, and reliability of the proposed project. Safety of the project will depend on the size and maneuverability of the ships using the waterway, size and type of channel, aids to navigation provided, magnitude and direction of currents in the waterway, wind and wave effects, and experience and judgment of the local pilots. Since human factors (pilot skill and diligence), are involved in navigation channel safety and are difficult to evaluate, potential hazardous conditions should be eliminated in the project design insofar as practicable. Therefore, optimum design of a specific waterway will require an evaluation of the physical environmental conditions, especially the currents and weather conditions and judgment of safety factors based on local pilot information." (Chapter 2, 2-5).

65. "Navigation project planners/designers should develop strong coordination with the local pilot groups throughout the project development. Pilot interviews can be used to determine the user's opinion on existing channel navigation safety and wind and wave conditions to be used for design analysis, and the feasibility and safety of proposed channel design alternatives." (Chapter 5, 5-12).

66. Pilots from the Tampa Bay Pilots Association are responsible for safe navigation at Port Manatee and throughout Tampa Harbor. The Tampa Bay Pilots Association has worked closely with the Jacksonville District to develop safe and efficient designs for deep-draft navigation features throughout Tampa Harbor. Their participation and cooperation associated with the engineering designs for Manatee Harbor have been invaluable.

67. In a letter dated February 28, 2003 from the Tampa Bay Pilots to U.S. Army Corps of Engineers, Jacksonville District, a Captain discusses safety and the dangerous conditions existing at Manatee Harbor for vessels attempting turning maneuvers. The Captain also discusses an "effective 1300 foot turning basin" that had been presented as a proposal to allow for safe turning maneuvers at Port Manatee. The proposal had been endorsement at a pilot association meeting. Referring to that "effective 1,300 ft effective turning basin", the Captain emphasizes that the project requires at least a 1,300 foot turning basin. The correspondence with the Tampa Bay Pilots is provided in the pertinent correspondence appendix.

68. According to the pilots, vessels with LOAs greater than 650' would have less than "optimal" turning space. This translates into about 20-25% of vessel calls, or 100-125 vessels per year. The largest vessels (797') are currently in the top one percent, increasing to 5-10% over time. Ship simulation studies were done in 1989 and 1999 as previously discussed. Although similar size vessels and similar size turning basins were simulated, these specific plans with this specific design vessel were not simulated. Although Alt 7 maximizes net benefits, Alt 4 provides less safety risk for a modest increase in cost.

Sensitivity Analysis

69. For the sake of completeness, a sensitivity analysis was performed to examine the impacts of known improvements planned within the area of the turning basin within the short term. The sensitivity analysis estimated the benefits of the alternative plans including the modification of Berth 5 as planned by MCPA. The modification of Berth 5 would involve extension of the berth to a 1,200-foot marginal wharf with a 40-foot draft (currently 350 feet with 20-foot draft). It would require dredging an access channel from the turning basin area to the berth 5 extension. However, this improvement would allow Vulcan Materials Company to relocate their operations to this berth and potentially bring in larger bulk vessels than currently used. The annual benefits attributable to the Berth 5 expansion represent incremental (additional) benefits. The annual costs reflect the incremental costs associated with the construction of channel access to Berth 5. **Table 14** presents the results of a sensitivity analysis comparing the above without-project condition to revised with-project conditions. Based on this analysis, Alternative 4 is the plan that maximizes net economic benefits with annual net benefits of about \$590,000 and a BCR of 1.1.

Table 14: Sensitivity Analysis

Alternative	Turning Basin	Sensitivity Analysis – Berth 5 extension				Net Benefits	Incremental AAE Costs of Berth 5
		Total Costs	AAE Benefits	AAE Costs	BCR		
Alt-3	900 ft.	\$40,153,000	\$5,767,000	\$5,163,000	1.12	\$605,000	\$140,000
Alt-7	900 ft. by 1200 ft.	\$41,280,000	\$5,767,000	\$5,178,000	1.11	\$589,000	\$85,000
Alt-4	900 ft. by 1300 ft.	\$41,862,000	\$5,782,000	\$5,193,000	1.11	\$590,000	\$63,000
Alt-6	1200 ft.	\$42,358,000	\$5,787,000	\$5,251,000	1.10	\$536,000	\$91,000

NED PLAN SELECTION

70. After screening all plans based on environmental implementability, the criteria of completeness, effectiveness, and efficiency, and acceptability, the sensitivity analysis above indicates that Alternative 4 would actually provide the maximum net benefits and an acceptable level of safety to the harbor pilots. For

the sake of completeness, acceptability, efficiency, Alternative 4 is designated the NED plan.

71. Special consideration was given to the sensitivity analysis above, where known planned improvements to adjacent port facilities influenced the NED designation. This condition contributed significantly to the completeness of the solution for the harbor with minor increase to cost of approximately \$15,000 Average Annual Equivalent Cost.

Environmental Summary

72. An Environmental Assessment (EA) was prepared for the Recommended Plan, concluding in a Finding of No Significant Impact (FONSI) signed by the District Commander on August 5, 2002. The EA and FONSI were prepared to evaluate the environmental effects of turning basin and channel widener configuration changes as presented in this report.

73. Construction of the Recommended Plan would result in a loss of shallow water habitats and seagrass beds. It is estimated that less than 2.5 acres of seagrasses would be impacted by the Recommended Plan. A mitigation plan to offset environmental impacts was completed in 1999.

Operation and Maintenance

74. The Federal Government would be responsible for operation and maintenance of the navigation improvements proposed in this report upon completion of the construction contract. The Federal Government currently maintains the existing project. The Sponsor would be responsible for all maintenance for berthing areas that benefit from this project. Phase I was completed in December 1996, and consisted of dredging the existing 400-foot channel to 40 feet and the berthing areas to their respective depths. Since that time there has been 2 maintenance cycles, one completed in August 1996, concurrent with Phase I construction, and the other completed in June 1999.

75. Without adequate historical maintenance data or a comprehensive shoaling analysis, it is difficult to quantify the anticipated average annual shoaling for the Manatee Harbor project. However, it is anticipated that the quantity of shoal material would remain relatively constant, and that an increase in the maintenance quantity resulting from construction of the Phase II portion of the project presented in this report would be minimal. For the current dredging contract at Manatee Harbor, there was no shoaling at the intersection of the Manatee and Tampa Harbor channel.

Revised 6/02/03

76. The quantities and costs for operations and maintenance is presented in the MCACES of the Engineering Appendix. For estimating purposes, periodic maintenance would be accomplished at 3-year intervals.

Disposal Area

77. All dredged material plan would be placed at the disposal area located about 10,000 feet away of the Port's facilities in a northeast direction. The existing diked upland disposal area located on port property would be used for placement of all dredged material from both initial construction and future maintenance. The without project dike is elevation 55 ft (NGVD 1929). It is to provide for disposal of the material excavated during completion for Phase II and the cumulative dredging maintenance for disposal of Phase I and Phase II material.

78. Disposal of dredge material for the cycles during the first 9 cycles will be into the Port's upland disposal area. Capacity will be maintained by offloading the upland disposal material and placing it into the nearby quarry pits located on Buckeye Road, approximately 2.5 miles from the disposal site. The quantities for the disposal requirements are addressed in the MCACES in the Engineering Appendix and the life-cycle management addressed in Appendix F.

Aids to Navigation

79. The U.S. Coast Guard would be responsible for providing and maintaining navigation aids. Additional aids to navigation would be required for this project; the estimated average annual cost is about \$15,000; which is included in the benefit to cost analysis.

COSTS AND BENEFIT TO COST ANALYSIS

80. **Summary of Costs.** The estimates of first cost for construction of the recommended plan were prepared using MCACES software and are presented in the Engineering Appendix. The estimate includes a narrative, a summary cost, and a detailed cost showing quantity, unit cost, and the amount for contingencies for each cost item. The costs of the non-construction features of the project are also included in the cost estimate. The costs have been prepared for an effective date of October 2002 (FY2003).

81. **Total Project Costs.** The total estimated cost includes overhead, contingency, turbidity monitoring, and other associated construction costs. The estimated mobilization and demobilization cost of the plan is approximately \$704,000. Excavation for the wideners and turning basin would require removal of approximately 2.68 million cubic yards of material at a cost of about \$13,540,000. The estimated cost of monitoring turbidity during the excavation work is estimated at \$102,000. Dike raising cost of \$ 9,894,000 is estimated to achieve a 55 ft. dike height for disposal which includes Phase I quantities.

82. The plan includes seagrass mitigation portion at a cost of \$914,000. The Coast Guard will provide navigation aides; the estimated cost for this is about \$15,000. Real Estate Administrative Cost is about \$25,000. The total project cost of the recommended plan is estimated at approximately \$28,213,000. This cost includes the cost for Preconstruction Engineering and Design (PED) for plans and specs, estimated at about \$1,204,000. Construction Management (S&I) is estimated at \$1,816,000. The Interest During Construction (IDC) cost is estimated at about \$820,000, for a total investment cost of about \$29,033,000. The itemization of first costs and IDC calculation is displayed in **Table 15**. The total cost for Phase I and Phase II with IDC is estimated at \$41,862,000.

83. **Average Annual Equivalent of Costs.** The AAEQ for the first cost of construction for Phase I and Phase II, including IDC is estimated at about \$2,610,000. The AAEQ cost for O&M is \$2,520,000. The total AAEQ cost is \$5,130,000.

84. **Benefit Cost Analysis.** The average annual equivalent value (AAEQ) value for the benefits for both Phase I and Phase II of the authorized project is \$5,318,000. The average annual cost was calculated at \$ 5,130,000. Based on these benefits and costs the benefit to cost ratio is 1.04 to 1 with net benefits of \$188,000.

Table 15: First Cost of Recommended Plan

Alternative	A-4
Mob/Demob	\$703,800
Excavation	\$13,539,786
Turbidity Monitoring	\$102,000
Dike Raising	\$9,894,000
Construction Management (S&I)	\$1,815,600
Environmental Mitigation	\$914,000
Real Estate	\$25,000
Navigation Aides	\$15,000
PED	\$1,203,600
Phase II Construction First Cost	\$28,212,786

ENVIRONMENTAL CONSIDERATION OF THE NED PLAN

85. Major environmental considerations taken into account during the formulation of the plan were: the presence of fish and wildlife resources, threatened and endangered species, cultural resources, water quality, hazardous and toxic wastes, aesthetic resources, acoustic quality, air quality, and recreation in the project area. All excavated material would be placed in a permitted disposal area

located within the Port's property. Standard manatee and sea turtle precautions would be in effect during construction to minimize impacts to those species. Potentially significant magnetic targets would be included in archeological no-work zones. Diver investigation of other significant magnetic targets reveals modern materials with no historic properties. All available and practicable means and measures have been incorporated into the GRR to ensure that the recommendations set forth are environmentally sound. Environmental investigations undertaken as part of this study are presented in an Environmental Assessment dated July 2002.

86. As Phase II is part of the authorized project the Sponsor proceeded with a multifaceted mitigation plan to compensate for the unavoidable impacts to sea grass meadows, mangroves and tidal marshes, unvegetated shallow flats and individual sea coral colonies in the project area. As the Sponsor obtained the required State permits, the sponsor also performed the seagrass mitigation work. This mitigation was conducted in accordance of Section 906 of the Water Resource Development Act of 1986, Public Law 99-662.

RECOMMENDED PLAN

87. The recommended plan for Phase II is for implementing the wideners at the entrance channel and constructing a turning basin based on Engineering, Environmental and Economic studies and Port coordination. The channel wideners would be constructed from approximately Station 93+00 to the intersection eastern edge of the Tampa Harbor Channel – Cut B. The wideners would be excavated to a project depth of 40 feet plus applicable overdepths. The recommended 900 ft by 1300 ft turning basin is configured by placing a 900-ft diameter turning basin, as per original authority of the project basin, and locating it adjacent to the northern edge of the channel with the center at approximately Station 25+80 and Range -450. The turning basin would be excavated to a project depth of 40 feet plus applicable overdepths. For estimating purposes, the average side slope for the proposed excavation was determined to be 1 vertical on 3 horizontal (1V: 3H).

88. An additional 1-foot of dredging depth is included in the excavation quantities as an allowable overdepth to provide for inaccuracies in the dredging process. An additional 1-foot of required overdepth in addition to the 1-foot of allowable overdepth is included in the estimated excavation quantities for the turning basin. This required overdepth would be necessary to facilitate future maintenance of the turning basin area due to the existence of hard material at project depth.

89. The existing diked upland disposal area located on port property would be used for placement of all dredged material from both initial construction and future maintenance. A dike height elevation 55 ft (NGVD 1929) will be available for disposal of the material excavated during completion of Phase II of the project

construction. This cost for preparation of the disposal area and raising the dikes from an elevation of 29 ft. to that of 55 feet is included as a cost to the authorized project in the MCACES cost estimate and in the Benefit to Cost Analysis.

Items of Non-Federal Responsibility

90. The sponsor has reviewed this limited reevaluation report and agrees with its conclusions and recommendations. The sponsor is also aware of the terms of the PCA and is prepared to accept its responsibilities as the non-Federal Sponsor, including the following:

- a. Provide, during the period of construction, a cash contribution equal to 25 percent of the costs of construction of the general navigation features which include the construction of land-based and aquatic dredged material disposal facilities that are necessary for the disposal of dredged material required for project construction, operation, or maintenance and for which a contract for the facility's construction or improvement was not awarded on or before October 12, 1996.
- b. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, up to an additional 10 percent of the total cost of construction of general navigation features. The value of lands, easements, rights-of-way, and relocations provided by the non-Federal sponsor for the general navigation features, described below, may be credited toward this required payment. If the amount of credit exceeds 10 percent of the total cost of construction of the general navigation features, the non-Federal sponsor shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of lands, easements, rights-of-way, and relocations in excess of 10 percent of the total cost of construction of the general navigation features;
- c. Provide all lands, easements, and rights-of-way, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project (including all lands, easements, and rights-of-way, and relocations necessary for dredged material disposal facilities); perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, maintenance, repair, replacement and rehabilitation of the Project;
- d. Provide, operate, maintain, repair, replace, and rehabilitate, at its own expense, the local service facilities; in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by

the Federal Government; provide and maintain without cost to the United States depths in berthing areas;

- e. Accomplish all removals determined necessary by the Federal Government other than those removals specifically assigned to the Federal Government;
- f. Grant the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the general navigation features for the purpose of inspection, and if necessary, for the purpose of operating, maintaining, repairing, replacing, and rehabilitating the general navigation features;
- g. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the United States or its contractors;
- h. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as will properly reflect total cost of construction of the general navigation features, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;
- i. Perform, or cause to be performed, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for construction, operation, maintenance, repair, replacement, or rehabilitation of the general navigation features. However, for lands that the Government determines to be subject to navigation servitude, only the Government shall perform such investigation unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;
- j. Assume complete financial responsibility, as between the Federal Government and the non-Federal sponsor, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or

under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features;

- k. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA;
- l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987, and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;
- m. Comply with all applicable Federal and State laws and regulations, including but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination of the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of Army"; The Non-Federal Sponsor is also required to comply with all applicable federal labor standards requirements including, but not limited to the Davis-Bacon Act (40 USC 276a et seq), the Contract Work Hours and Safety Standards Act (40 USC 327 et seq) and the Copeland Anti-Kickback Act (40 USC 276c);
- n. Provide a cash contribution equal to the non-Federal cost share of the project's total historic preservation mitigation and data recovery costs attributable to commercial navigation that are in excess of 1 percent of the total amount authorized to be appropriated for commercial navigation; and
- o. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute;
- p. Provide and maintain without cost to the United States adequate public terminals, berthing areas, and transfer facilities open to all on equal terms;
- q. Provide and maintain without cost to the United States, operation, maintenance, repair, replacement, and rehabilitation of all mitigation areas for the life of the authorized project as described in the recommended plan.

Cost Sharing

91. Under the Water Resources Development Act (WRDA) 1986, as amended by Section 201 of WRDA 1996, Federal participation in navigation projects is limited to sharing costs for design and construction of the general navigation features (GNF) consisting of breakwaters and jetties, entrance and primary access channels, widened channels, turning basins, anchorage areas, locks, and dredged material disposal areas with retaining dikes. Non-federal interest are responsible for and bear all costs for acquisition of necessary lands, easements, rights-of-way and relocations; terminal facilities; and dredging berthing areas and interior access channels to those berthing areas.

92. Section 101 of WRDA 1986 as amended, requires the project sponsor to bear a percentage share of harbor construction costs for project components that are cost-shared (general navigation features, mitigation) that varies according to the range of water depths where the work is done. That variable cost share is paid during construction.

93. Section 101 (a)(1)(A) of WRDA 1986 specifies that for commercial navigation projects with a depth up to 20 feet, cost sharing for construction of the project's GNF is 90 percent Federal and 10 percent non-Federal. For a depth in excess of 20 feet but not in excess of 45 feet, cost sharing for construction of the project's GNF is 75 percent Federal and 25 percent non-Federal. This cash contribution is to be paid during construction.

94. Furthermore, Section 101 (a)(2) of WRDA 1986 specifies that non-Federal interests shall pay an additional 10 percent of the cost of the GNF in cash over a period not to exceed 30 years, at an interest rate determined pursuant to Section 106 of WRDA 1986. The value of lands, easements, and rights-of-way necessary for the project shall be credited toward this 30-year cash payment. Aids to navigation (operated and maintained by the U.S. Coast Guard) are a 100 percent Federal cost. Section 103(c)(4) of WRDA 1986 also mandates a non-Federal share equal to 50 percent of joint and separable costs allocated to recreational navigation. That cost share is paid during construction. The recommended plan for Manatee Harbor does not include any recreational navigation features.

95. Policy Guidance Letter (PGL) No. 62, "Navigation (Harbors) Cost Sharing Policy Applications" provides guidance on the application of navigation cost sharing as contained in Section 101 of the Water Resources Development Act of 1986, as amended. **Table 16** shows the current Federal cost sharing percentages allocated to specified depth zones. This table is derived from ER 1105-2-100, April 2000 (Table E-12: Navigation, Construction and O&M).

96. The cost apportionment is shown in **Table 17**. The cost sharing for Phase II is based on general navigation feature costs, which includes excavation costs for dredging, environmental mitigation costs, planning engineering and design (ped)

costs, and disposal costs. The capacity for the upland disposal area will be increased by raising the dikes for Phase I and Phase II material. The non-federal Sponsor has existing capacity in the disposal area that it owns. The cost sharing for the executed PCA amendment has been adjusted for the dredged material upland disposal area expansion construction since the non-federal sponsor is currently under the PCA required to pay for disposal capacity for non-federal material.

Table 16: Cost Allocation

Feature	Federal Cost % ¹	Non-Federal Cost % ¹
General Nav. Features (GNF)	<ul style="list-style-type: none"> • 90% from 0' to 20' • 75% from >20' to 45' • 50% > 45' and deeper 	<ul style="list-style-type: none"> • 10% from 0' to 20' • 25% from > 20' to 45' • 50% > 45' and deeper
GNF's costs for this project include: mobilization/demobilization, all dredging costs, all disposal area construction costs, mitigation costs.		
Associated Costs²	• 0%	• 100%
Associated costs for this project are: dredging of Port berthing areas; port infrastructure construction; lands, easements, and rights of way, and acquisition of disposal sites; all utility relocations; costs for features requested by Port in excess of NED.		
Navigation Aids	• 100%	0%
Operation and Maintenance		
GNF	<ul style="list-style-type: none"> • 100% except cost share 50% costs for maint. > 45 feet 	<ul style="list-style-type: none"> • 0% except cost share 50% for maint. > 45 feet
Port berths, Port , Infrastruc.	• 0%	• 100%
Mitigation	• 0%	• 100%

Table 17: Cost Apportionment

ITEM	Phase II Costs		Total	Federal	Non-Federal
	Contract	Contingency			
				75 %	25%
Construction Costs					
Dredging					
Mob, Demobil & Prep Work	690,000	13,800	703,800	527,850	175,950
Pipeline Dredging	13,274,300	265,486	13,539,786	10,154,840	3,384,947
Disposal Area 1/	9,700,000	194,000	9,894,000	7,420,500	2,473,500
Environmental Mitigation 2/			\$914,000	0	914,000
Planning Engineering and Design	1,180,015	23,600	1,203,615	902,711	300,904
Construction Management (S&I)	1,780,002	35,600	1,815,602	1,361,702	453,901
Associated General Items	100,000	2,000	102,000	76,500	25,500
Subtotal GNF			28,172,803	20,444,102	7,728,701
Aids to Navigation			15,000	15,000	3/
Lands, Easements, Rights of Way and Relocation			0		
Real Estate, Administrative Cost 4/			25,000	18,750	6,250
Total GNF			28,212,803	20,477,852	7,734,951
Additional 10% of GNF				(2,817,280)	2,817,280
Associated Non-Federal Costs					0
Cost Sharing for Recommended Plan				17,660,572	10,552,231
1/ Future trucking disposal as presented in Appendix C to be cost shared as General Navigation Feature.					
2/ Environmental Mitigation costs estimated for actual area of impact based on August 2002 Port Letter. Supersedes cost estimated in MCACES. This cost is 100% non-federal; currently the Army is without authority to allow the non-federal Sponsor Credit.					
3/ Navigation Aids -- 100% Federal.					
4/ Per Real Estate Appendix.					

FLOOD PLAIN DEVELOPMENT

97. Executive Order 11988 requires the Federal Government to avoid, if possible, adverse impacts associated with the occupancy and modification of flood plains as well as direct or indirect support of development in those areas where there is a practical alternative. The existing port facilities at Manatee Harbor are already in the 100-year flood plain (National Flood Insurance Program). Federal improvement of the existing navigation project will encourage continued use of existing facilities on those lands as well as those already planned for future growth in commerce. Port development will occur with or without the proposed improvement.

CZM CONSISTENCY

98. The Coastal Zone Management (CZM) Act of 1972, as amended (PL 92-583) requires all Federal activities inside or outside a state's coastal zone to be consistent with the state's coastal zone management plan if the activities affect natural resources, land uses, or water uses within the coastal zone. A Water Quality Certificate (WQC) has been issued by the State for this project. By

issuance of the WQC, the State determines that the project is consistent with the state CZM Act.

COASTAL BARRIER RESOURCES ACT

99. The Federal navigation project at Manatee Harbor does not include any new Federal expenditures or financial assistance prohibited by the Coastal Barrier Resources Act (PL 97-348); nor were funds obligated in the past years for this project for purposes prohibited by this Act.

VIEWS OF THE NON-FEDERAL SPONSOR

100. The non-Federal Sponsor strongly supports the Recommended Plan and would like implementation at the earliest possible date.

DISCLAIMERS

101. The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposal for project modifications and/or implementation funding.

CONCLUSIONS

102. This Limited Reevaluation Report evaluated the benefits and costs for implementing the authorized project for the entrance widenings to the Manatee Harbor access channel with Tampa Harbor and providing a turning basin for the existing fleet based on the design vessel; Phase II construction of the authorized project. Alternative 3 does not meet engineering design criteria; nor was a ship simulation study conducted with the design vessel and this specific configuration. Alternative 7 marginally meets design criteria while maximizing net benefits. As a result of the sensitivity analysis, which considered known plans for adjacent Harbor improvements, Alternative 4 provides a more comprehensive, complete solution to Harbor problems and greater net benefits. Alternative 4 was also considered by Harbor pilots to provide an acceptable level of safety.


103. The recommended plan, Alternative 4, the 900 ft turning basin with an effective turning area of 1300 ft has a first cost of approximately \$28,213,000. This plan costs about 5.7% more than plan alternative 3, and is considered a safe plan that the Pilots desire and meets the Port's need.

Revised 6/02/03

RECOMMENDATIONS

104. I recommend Alternative A-4 the NED Plan which includes expansion of the turning wideners at the entrance channel, a 900 ft by 1300 ft turning basin, and associated features for the Phase II construction of the Manatee Harbor navigation project. This plan is economically justified with a benefit to cost ratio of 1.04 and net benefits of about \$188,500.

105. The Corps of Engineers deep-draft navigation design guidance is clear on the importance of safety as a component in the engineering design process for deep-draft navigation features. That guidance clearly establishes that safety associated with the engineering design has significant weight in the decisions process. This plan meets the needs of the pilots for safe maneuverability. This substantially more compete, comprehensive, effective, efficient, and acceptable after considering other actions.



James G. May
Colonel, U.S. Army
District Engineer

Figure 1

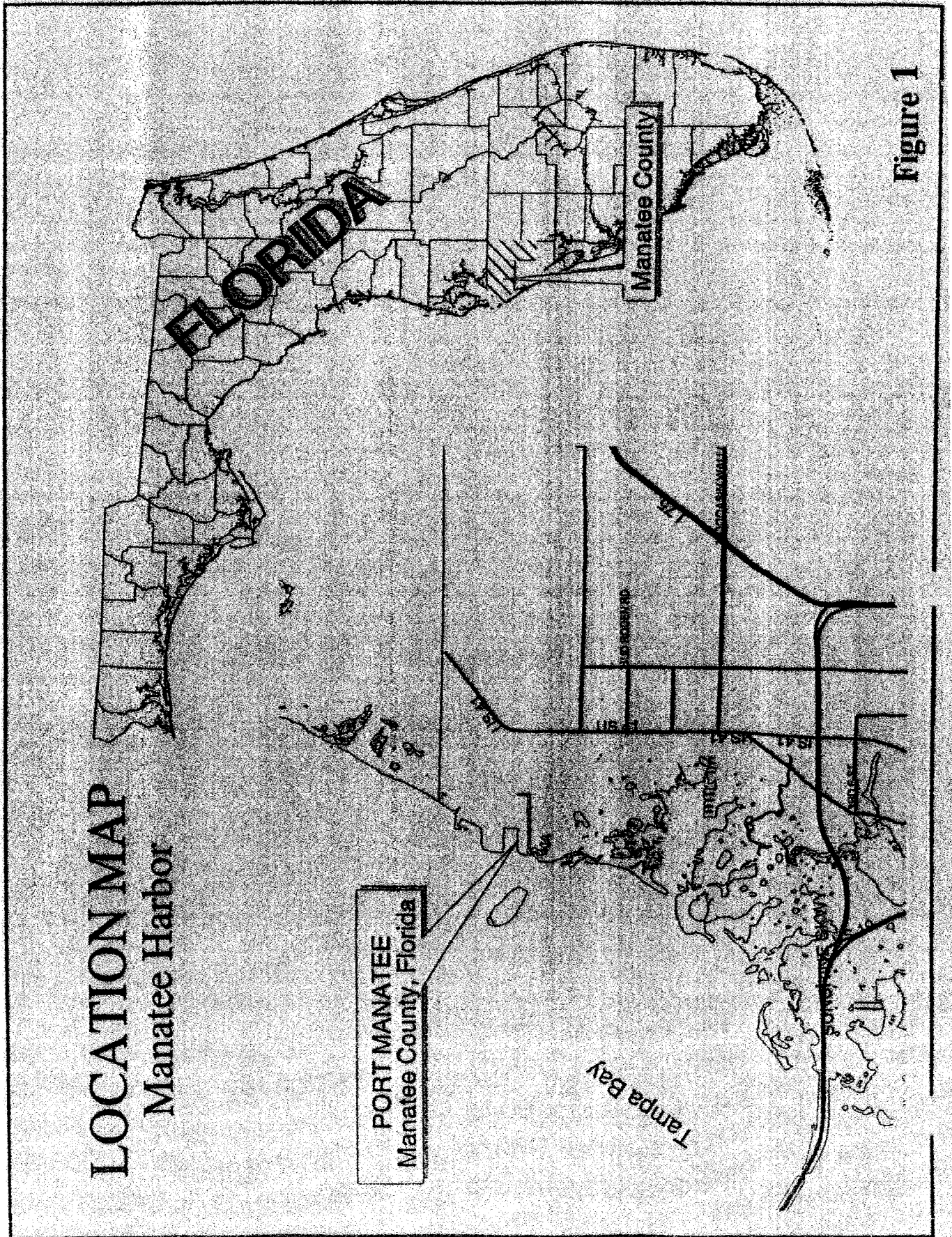


Figure 2: Manatee Harbor Channel Access

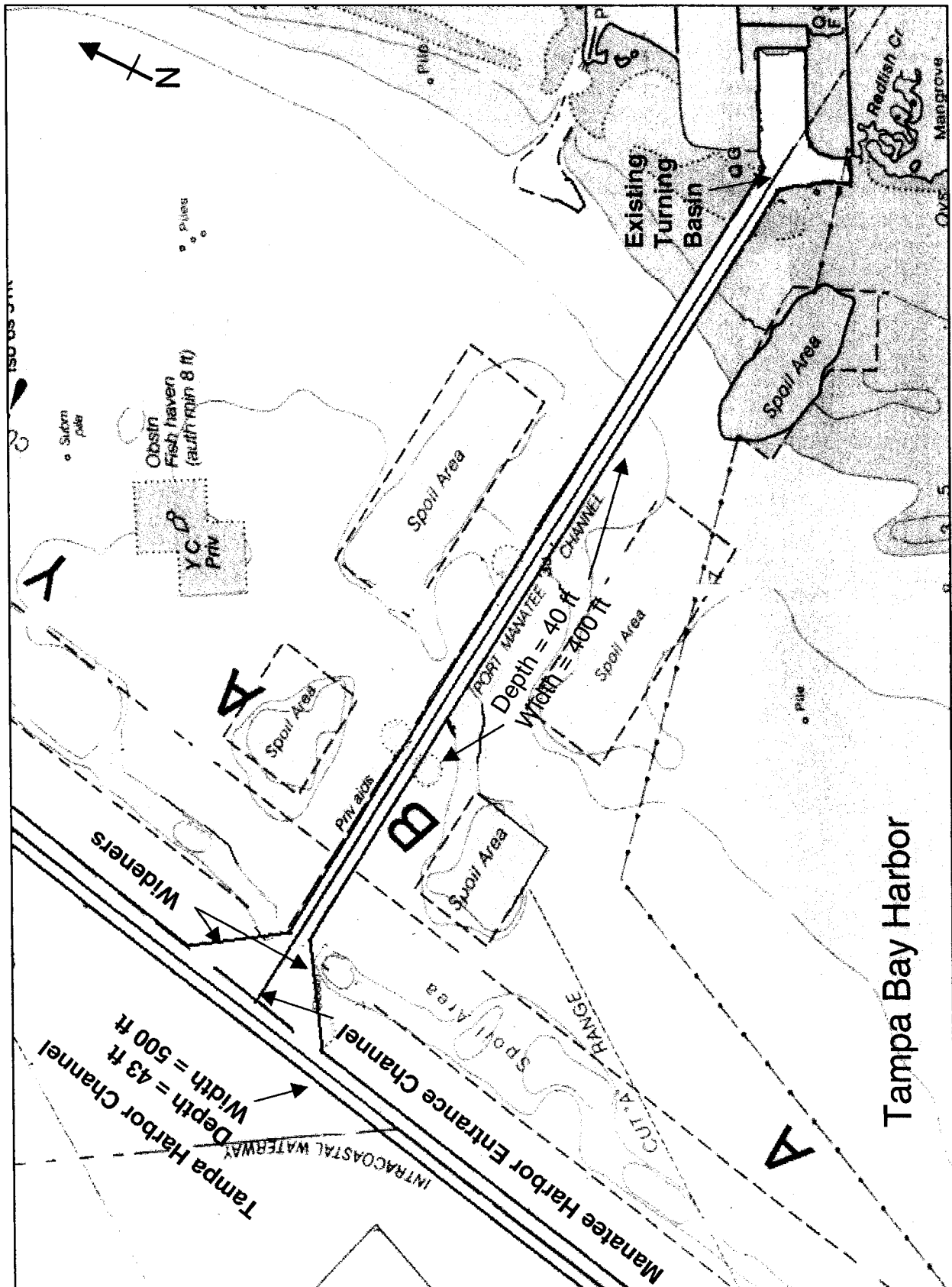
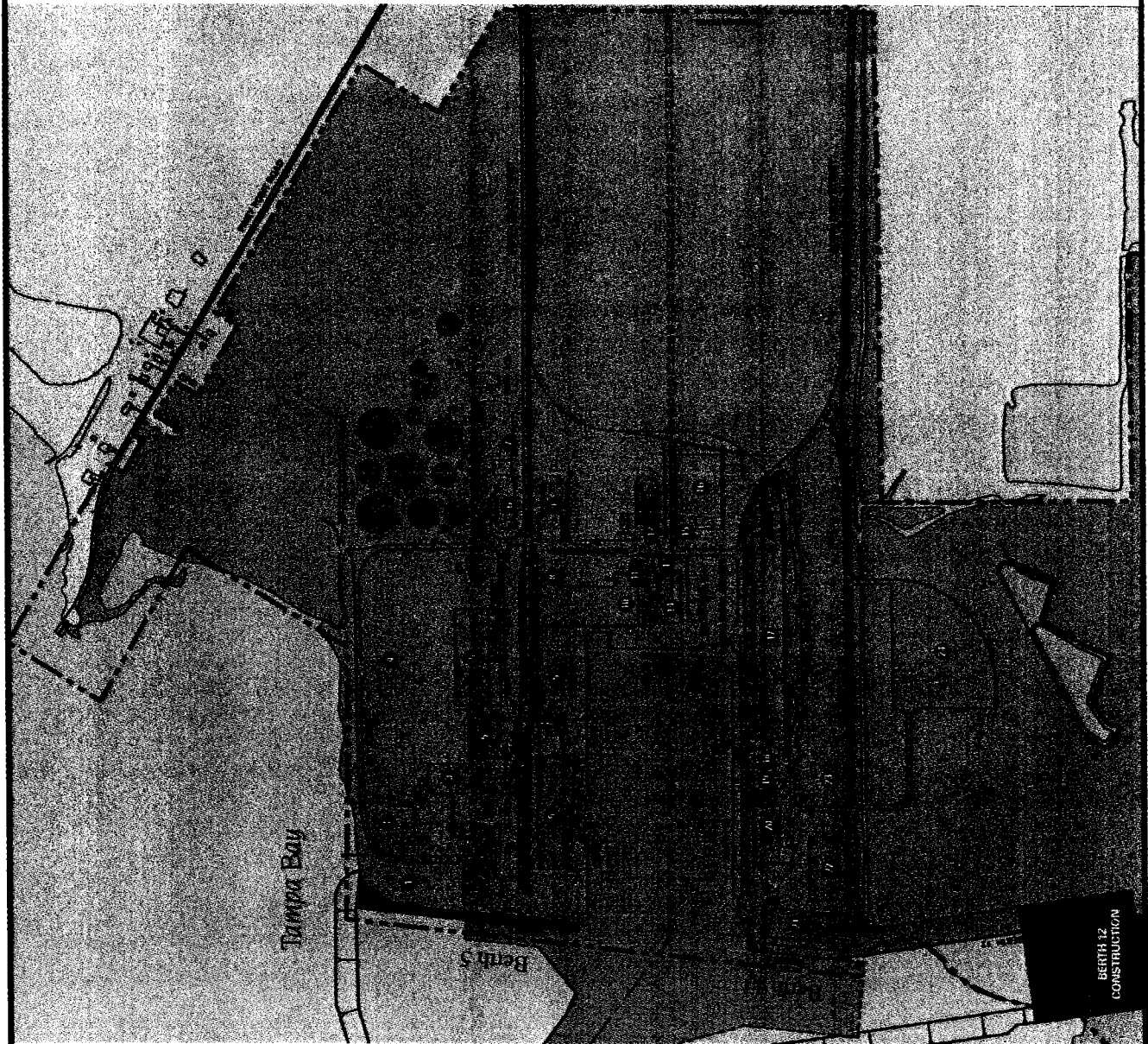


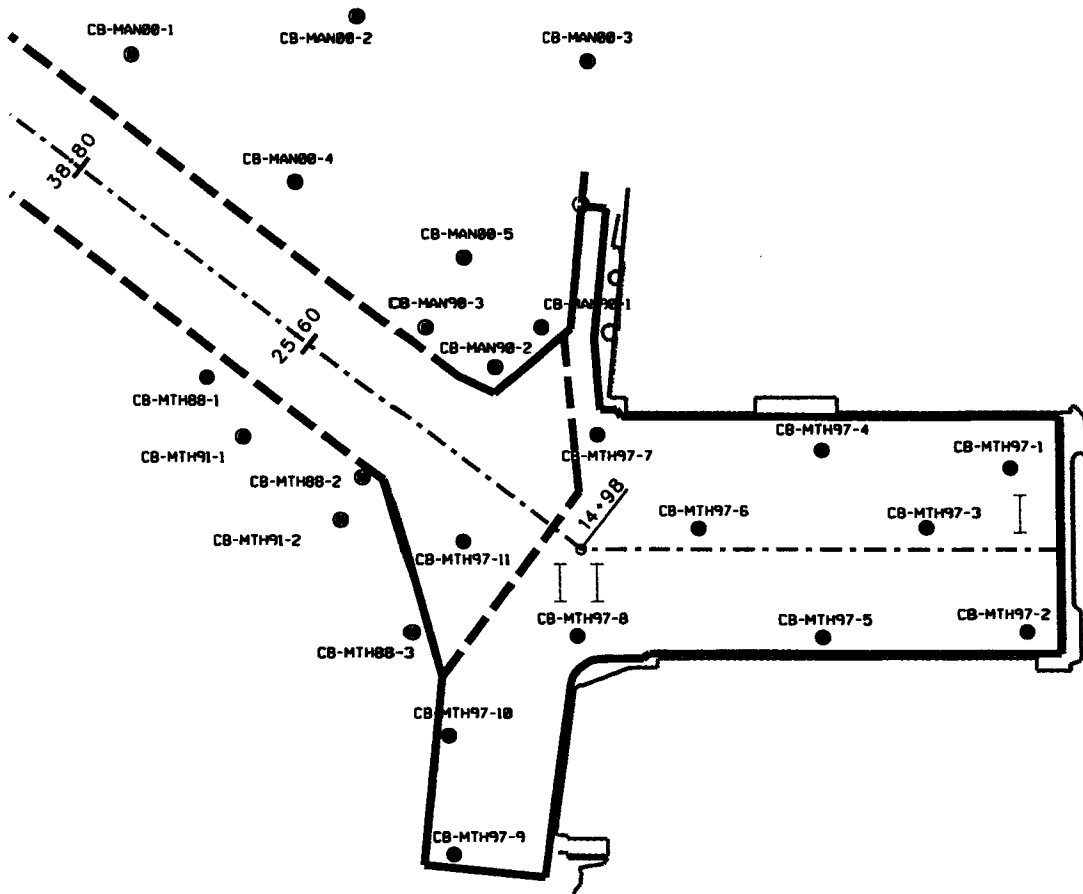
Figure 3: Port Configuration



Port Manatee 2003 existing Port configuration per Port Manatee 2002/2003 official directory. Figure also highlights proposed Berth 5 extension and Berth 12 construction. See Table 1 for Berthing Area Configuration.



TURNING BASIN (EXISTING CONDITION)



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Scale: AS SHOWN
Plot date: 05/20/03
Plot scale: 1"=100'

Designed by: R.E.M.
Drawn by: R.E.M.
Date: May 2003

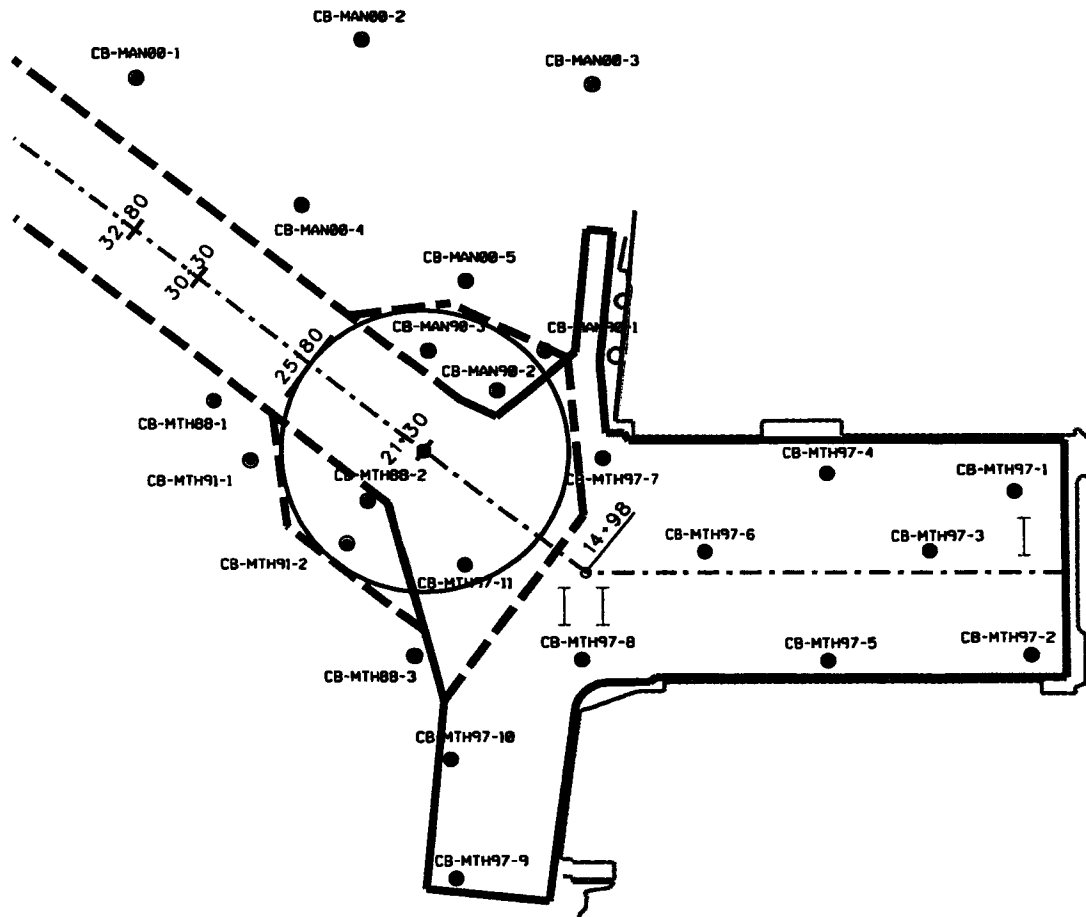
Limited Reevaluation Report

MANATEE HARBOR, FLORIDA

EXISTING HARBOR CONFIGURATION
LIMITED REEVALUATION REPORT

PLATE
1

TURNING BASIN 900'
CENTERED ON THE CHANNEL
(CURRENTLY AUTHORIZED)



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: SLE/JL Scale: AS SHOWN
Drawn by: SLE/JL Plot date:
Date: May 2003

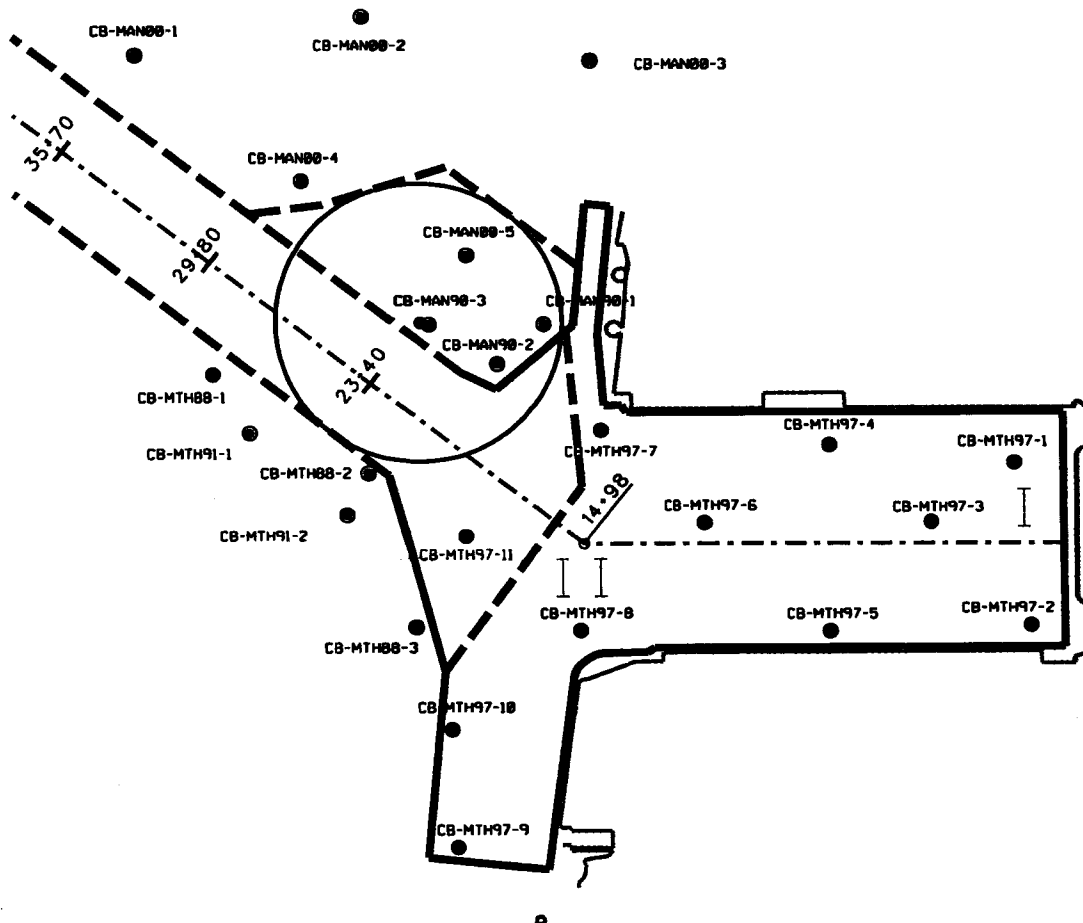
File name:
Reference flag:
Limited Reevaluation Report

MANATEE HARBOR, FLORIDA

TURNING BASIN - ALTERNATIVE 1
LIMITED REEVALUATION REPORT



TURNING BASIN 900'
TANGENT OF THE SOUTHSIDE
TO THE CHANNEL
(STA. 23+40, RGE. -50.)



US Army Corps
of Engineers
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Scale: AS SHOWN

Plot date:

Plot scale:

Designed by:
R.E.M.

Drawn by:
R.E.M.

Reference files:

File name:

Date:

May 2003

Limited Reevaluation Report

MANATEE HARBOR, FLORIDA

TURNING BASIN - ALTERNATIVE 4

LIMITED REEVALUATION REPORT

PLATE

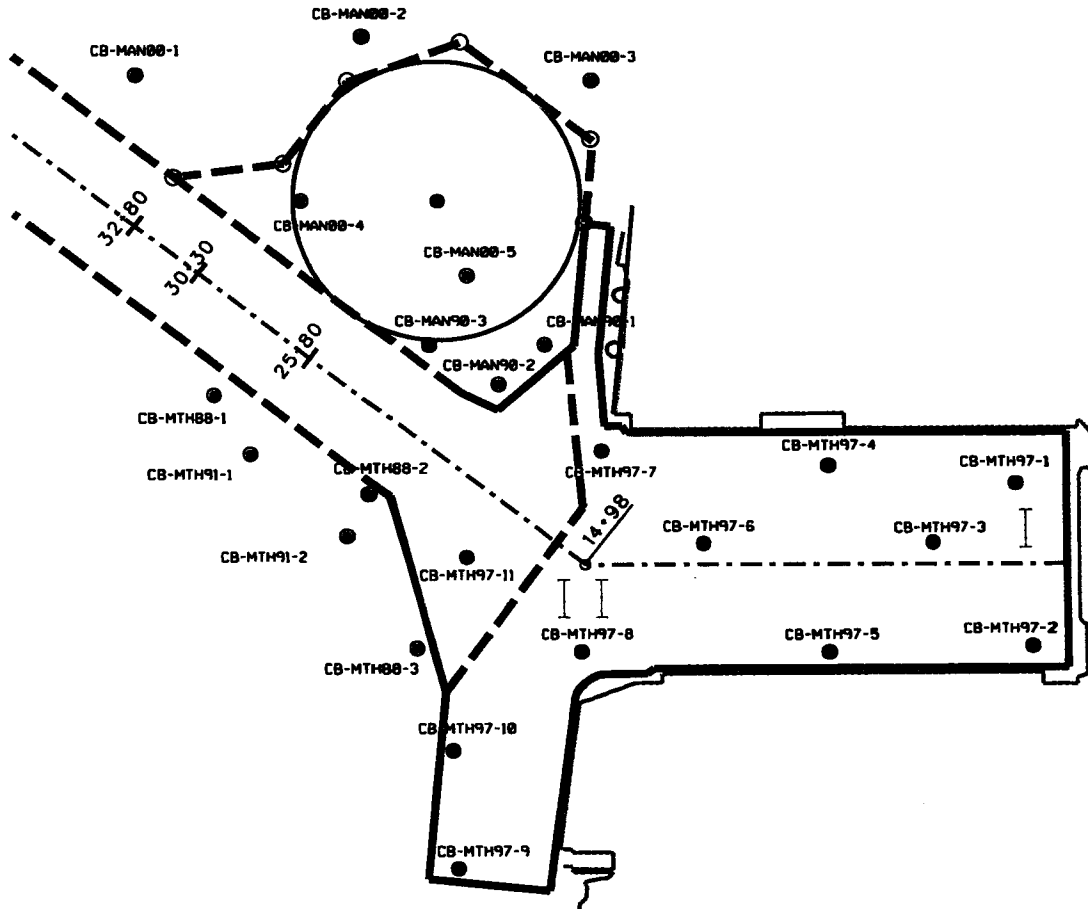
3



US Army Corps
of Engineers
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

TURNING BASIN
900' X 1300'
(EFFECTIVE 1300')
(STA. 25+80, RGE. -450)



Scale: AS SHOWN

Designed by: R.E.M.
Drawn by: R.E.M.
Checked by: R.E.M.
Date: May 2003

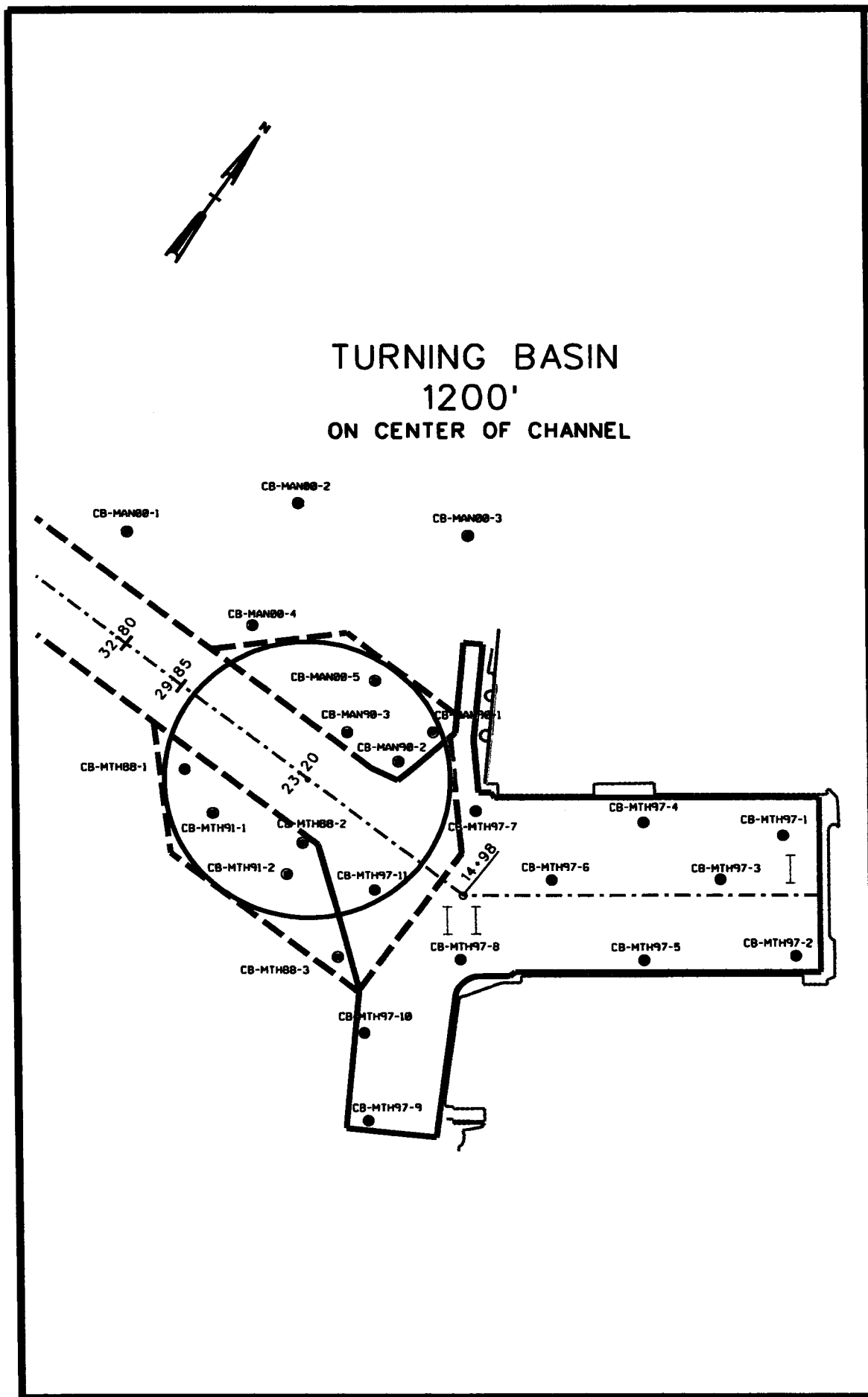
Limited Reevaluation Report


MANATEE HARBOR, FLORIDA

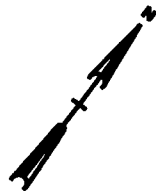
TURNING BASIN - ALTERNATIVE

LIMITED REEVALUATION REPORT

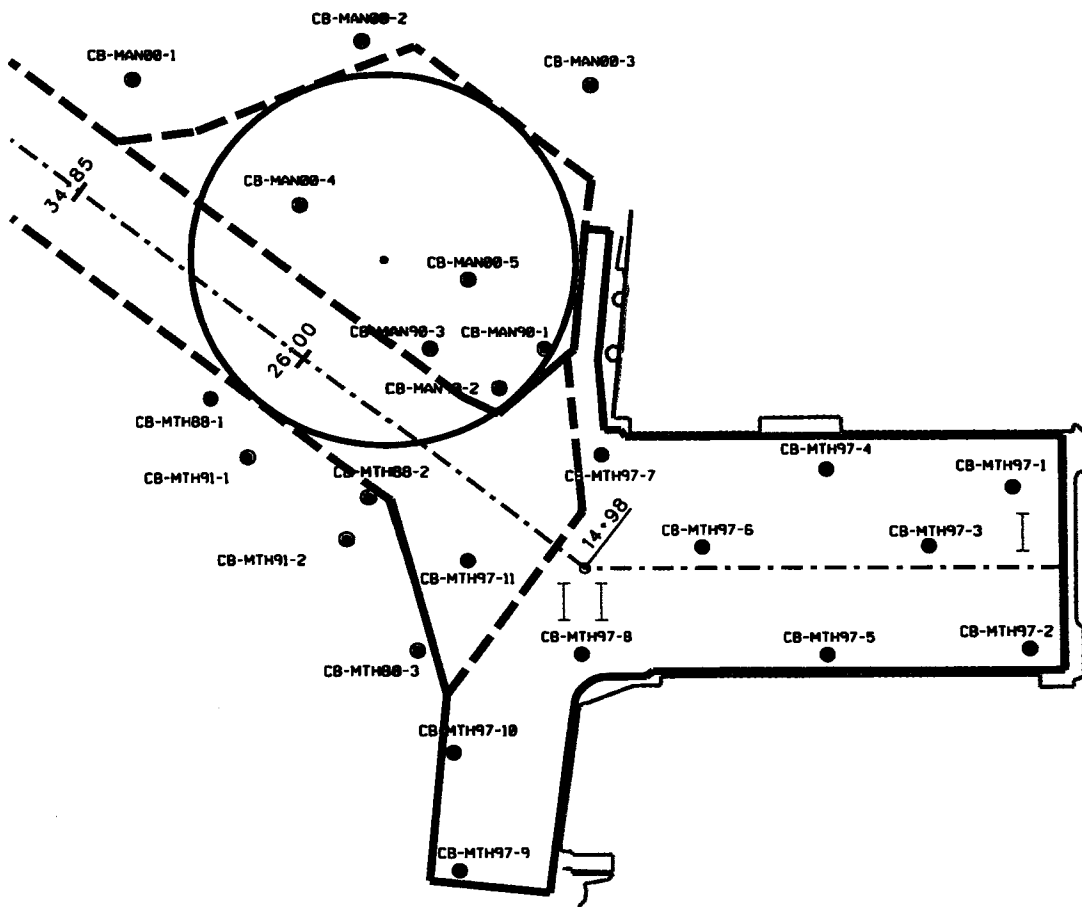
PLATE
4



 US Army Corps of Engineers Jacksonville District	
DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	
File name: Reference list:	Designed by: Scale: AS SHOWN Plot scale: Date: May 2003
MANATEE HARBOR, FLORIDA TURNING BASIN - ALTERNATIVE 1A LIMITED REEVALUATION REPORT	
PLATE 5	



TURNING BASIN
1200' DIAMETER
TANGENT TO SOUTHSIDE
OF THE CHANNEL
(STA 26+00, RGE. -205)



US Army Corps
of Engineers
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: M.E.M. Scales: AS SHOWN

Drawn by: M.E.M. Plot date: Plot scale:

Date: May 2003
Limited Reevaluation Report

File name:

Reference (last)

MANATEE HARBOR, FLORIDA

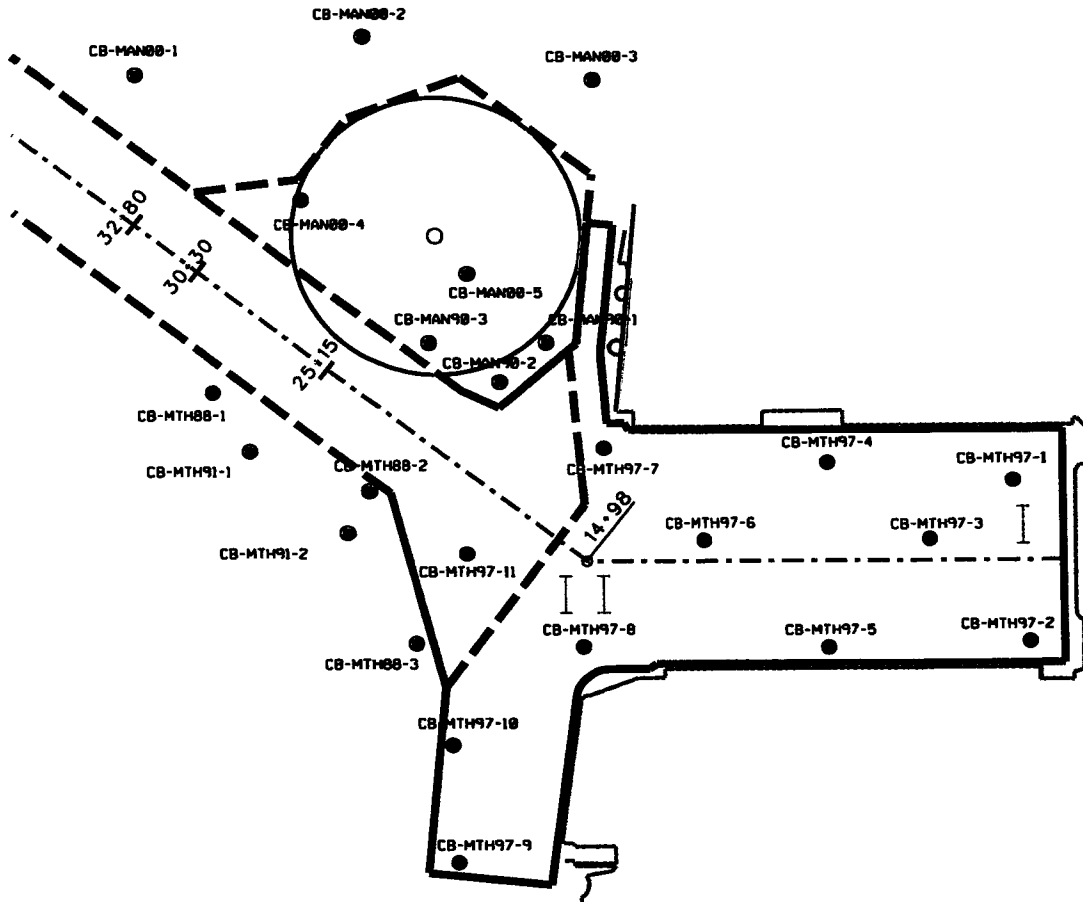
TURNING BASIN - ALTERNATIVE 2

LIMITED REEVALUATION REPORT

PLATE
6



TURNING BASIN
900' X 1200'
WITH OVERLAP INTO CHANNEL
(STA. 25+15, RGE. -350)



US Army Corps
of Engineers
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

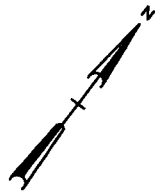
Designed by: AS SHOWN
Scale: Plot date:
Rev by: Plot date:
Rev by: Plot date:

Date: May 2003
Limited Reevaluation Report

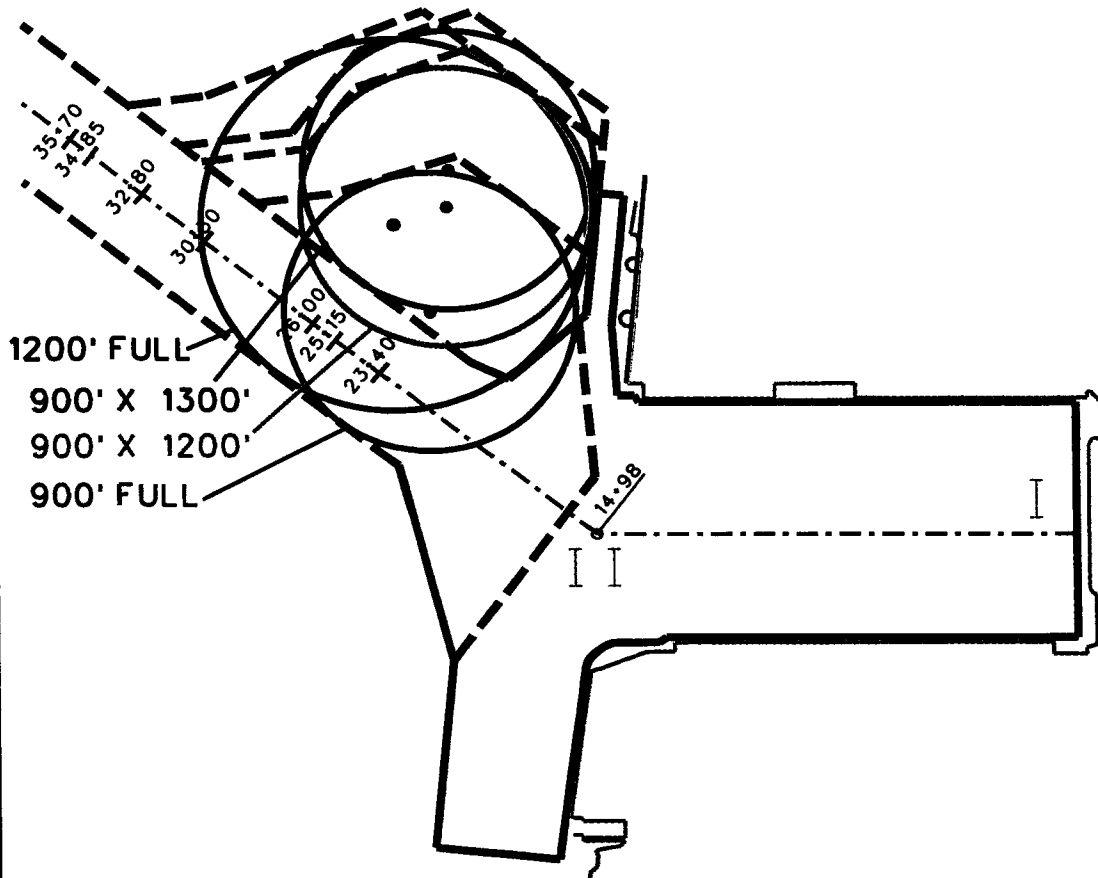
File name:
Reference file:

MANATEE HARBOR, FLORIDA
TURNING BASIN - ALTERNATIVE
LIMITED REEVALUATION REPORT

PLATE
7



OVERLAY OF TURNING BASIN CONFIGURATIONS



US Army Corps
of Engineers
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Designed by: R.E.M. Scale: AS SHOWN
Drawn by: C.M.Y. Plot date:
Date: May 2003 Plot scale:
Limited Reevaluation Report

File name:
Reference flag

MANATEE HARBOR, FLORIDA
TURNING BASIN - ALTERNATIVES
LIMITED REEVALUATION REPORT

PLATE
00